

PENTACHLOROPHENOL

CONTAMINATION

AT

TIME OIL COMPANY

NORTHWEST TERMINAL

12005 NORTH BURGARD ROAD

PORTLAND, OREGON

OCTOBER 1, 1986

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## EXECUTIVE SUMMARY

On March 1, 1967, Time Oil Co. and Koppers Company entered into an agreement wherein Time would provide certain labor and services connected with the receipt, storage, handling and blending of specified woodtreating products, including pentachlorophenol. All products were owned by Koppers. The site selected for this activity included a warehouse and tank farm on a small (70' x 70') portion of Time's 45 acre Northwest Terminal located at 12005 North Burgard Road in Portland, OR.

The operation started up and continued routinely until January 28, 1981. Time then advised Koppers of its election to terminate the project effective March 31, 1982, the scheduled agreement expiration date. Various in-house inspections had indicated the possibility of soil contamination. Subsequent bioassay tests confirmed the existence of pentachlorophenol in the soil adjacent to the warehouse. Both companies concurred to close the site. Operations ceased. Orderly phase out actions were established and begun.

It is noteworthy that this entire closure effort was jointly planned and undertaken by the two companies to voluntarily correct what both felt may become a future problem.

By February 1985, on hand product inventory had been blended off and shipped out. All tanks and piping had been cleaned, with cleaning wastes being shipped to Arlington. Piping and tanks had been disassembled, removed and scrapped. In short, the site was cleared to ground level.

Soil clean-up began. Following coordination with the DEQ, the Arlington landfill and local contractors, some 242 tons of soil were shipped to Arlington. A sampling matrix was prepared and more than 150 soil samples were collected and analyzed for PCP. Concentration isopleths were generated, which depicted remaining contamination locations and degrees of contamination, the highest of which was 116,000 ppm. Isopleths showed site size had now expanded to about 70' x 140' in area. The concrete wall along the western edge of the site was removed, decontaminated and disposed of to facilitate removal of this newly discovered increased area of soil contamination. To aid in reducing the physical size of this newly defined area, the extremities of site soil were centralized to the one spot having the highest known contaminant concentration. Soil relocation actions were based on previously plotted contour determinations. They were successful in that the area was reduced to about 60' x 60'.

At the end of 1985, the EPA advised Time that soil contaminated with leaked PCP had been reclassified as hazardous waste (number F027) and that there were currently no hazardous waste facilities in the U.S. that would accept this waste.

Pending resolution of EPA/DEQ acceptable disposal methods for PCP contaminated soil, efforts were directed toward the determination of possible groundwater contamination. Fourteen wells were installed and developed during 1986. Two were subsequently closed due to inefficient operation. Remaining wells have been repeatedly sampled and those samples analyzed for PCP. Concentrations have not exceeded .044 ppm at the highest reading. While well water analysis is scheduled to continue quarterly until the project is completed, to ensure no groundwater migration goes undetected, there appears to be no real groundwater problem.

Since there was no regulatory relief in sight, which would permit off-site disposal of PCP contaminated soil, Time initiated an assessment of on-site remedial alternatives. Recommended actions are:

- a. Select the "Surface Mounted Soil Washing" technique as the most logical remedial approach.
- b. Perform bench scale and pilot level evaluations.
- c. Determine necessary destruction steps of recovered extracts.
- d. Ascertain technical permitting and economic feasibility of technique for final disposal action.
- e. Compare results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

## **TABLE OF CONTENTS**

<b>SECTION I</b>	<b>History</b>
	<b>A. Background</b>
	<b>B. Initial Cleanup Efforts</b>
	<b>C. Summary</b>
<b>SECTION II</b>	<b>Remedial Alternative Assessment</b>
	<b>A. Introduction</b>
	<b>B. Alternatives</b>
	<b>C. Summary</b>
	<b>D. Recommendations</b>
<b>SECTION III</b>	<b>Analysis Results</b>
<b>SECTION IV</b>	<b>Laboratory Analysis Reports</b>
<b>SECTION V</b>	<b>Chain-Of-Custody Forms</b>
<b>SECTION VI</b>	<b>Analysis Request Forms</b>



## SECTION I

### HISTORY

Section I provides a sequential summary of those activities relating to pentachlorophenol (PCP) operations within the Time Oil Company Northwest Terminal located at 12005 North Burgard Road in Portland, Oregon. The information was gathered from Time Oil files at the firm's Seattle headquarters. Data was extracted from reports, memos and other correspondence from Time employees, the Oregon Department of Environmental Quality (DEQ), the US Environmental Protection Agency (EPA) and private consultants.

### BACKGROUND

#### Agreement with Koppers Company, Inc. (1967-1982)

On March 1, 1967, Time Oil Company reached an agreement with the Koppers Company, whereby Time would provide the storage, handling and distribution of Koppers owned specialty woodtreating chemicals, including PCP. The operating area included a warehouse building and an adjacent tank farm area (about 70' x 70') with an earthen surface. This small site was to become known collectively as the woodtreating chemicals area. Early in 1981, Time notified Koppers of their intent to terminate the agreement on March 31, 1982. Time and Koppers jointly agreed to immediately cease all PCP operations at the site, to remove all products, to clean all tanks and pipelines, to remove and dispose of all tanks and pipelines, to effect clean up of whatever contamination existed and to do it all within existing regulatory guidelines.

#### Various Site Inspections (1971-1984)

A summary of in-house site inspections, over the ten year period (1971-1981), identified the following problems related to the PCP operation.

- o No spill control system in warehouse. Spilled liquid was able to run unrestricted through the warehouse area and drain out through doors. Sloping of the warehouse floor and installation of drains was recommended.

- o Floor of warehouse work area caked with product. Steam cleaning recommended.
- o No warning signs were posted which call attention to hazards in the area where PCP was stored and mixed.
- o Ground near end of pipelines saturated with product to a depth of 12 inches.

During February 1983, Time contracted with the AM-Test Corporation to conduct a fish bioassay test on the site soil. Analysis resulted in a finding of the soil (only) being toxic at the 100 and 1000 ppm levels.

On a subject matter completely unrelated to the pentachlorophenol operation and Time/Koppers planned actions, the DEQ conducted an inspection of the entire Northwest Terminal facility on October 25, 1984. On that date, the DEQ advised their intent to collect soil samples throughout the facility. It is because of this latter DEQ advisory that the following soil test results are included since two samples were taken from the woodtreating chemicals area.

On December 12, 1984, DEQ personnel collected twelve soil samples from the entire facility. Splits of each sample were provided to Time. DEQ analytical results were received by Time on January 24, 1985. The DEQ samples were analyzed for EPA Priority Pollutants and for other substances identifiable through GC/MS scan, with a specific interest in lead content. No samples were found to have lead concentrations above the detection limit. The samples were also analyzed for fourteen pesticides, but no concentrations above the detection limit were found. Non-priority GC/MS scans indicated the presence of low concentrations of petroleum hydrocarbons in three of the twelve samples. In the analysis for EPA Priority Pollutants, ten of twelve samples were found to contain either no concentrations of any organics above the detection limit, or only trace amounts of polynuclear aromatics. One sample, taken from the woodtreating chemicals tank farm, contained 515 ppm of PCP and 12 ppm of tetrachlorophenol (TCP). The second sample from this area contained 1820 ppm of PCP and 71 ppm of TCP.

Sample splits, which had been provided to Time, were then submitted to Coffey Laboratories for analysis in order to confirm DEQ findings. Results of these analyses were received on March 15, 1986 and showed no PCP concentrations higher than 275 ppm. No pentachlorophenol was detected in any sample outside of the woodtreating chemicals area.

#### INITIAL CLEAN UP EFFORTS

##### Proposal for Removal of Contaminated Soil (1983)

In October of 1983, pending completion of site tank and pipeline

physical removal, plans were made to excavate and dispose of soil to a depth below that where PCP contamination was found to exist. This was to be a three phase effort, fully coordinated with the DEQ and the disposal facility. Phase I consisted of initial soil removal and its transport to an authorized disposal facility. Phase II involved a thorough investigation to determine the extent of PCP contamination and its degree of concentration. Phase III was to remove and dispose of any remaining soil which was detected, by laboratory analysis, to be contaminated above acceptable limits.

On November 1, 1983, a delay in Phase I of the planned removal occurred because ownership of the hazardous waste facility at Arlington changed and some period of time was needed for the new management to reach full operational status. Further, an agreement from the new owners (Chemical Waste Management) to accept the soil at Arlington prior to any excavation was absolutely essential to ensure that Time did not become classified as a hazardous waste storage facility.

#### Removal and Disposal of Contaminated Soil (February - June, 1985)

On February 4, 1985, Time reiterated to the DEQ, its intent to excavate PCP-contaminated soil and dispose of it at an approved disposal facility. On February 19, Time executed a contract with Northwest Vacuum Truck Service, Inc. for removal and transport of the contaminated soil. On May 14, the DEQ granted approval for disposal of the PCP-contaminated soil at the Arlington landfill. On June 24, an agreement covering disposal was reached with Chem-Security Systems, Inc., operator of the Arlington facility.

Between June 25 and June 28, 1985, 288 cubic yards (242.76 tons) of soil were removed and shipped to Arlington. The soil was excavated to a depth of 2 to 4 feet below grade in the northwest corner of the woodtreating chemicals tank farm.

#### Soil Sampling (June - July, 1985)

On June 28, 1985, following completion of contaminated soil excavation, Time retained Riedel Environmental Services to perform sampling and analysis of the remaining soil. Samples of surface soils were initially collected from 22 locations around the perimeter of the woodtreating chemicals tank farm area. Three composite samples were formed and analyzed, showing PCP concentrations of up to 860 ppm. Samples of the soil from 81 individual sample sites surrounding the woodtreating tank farm area were then collected and analyzed for PCP. The results indicated that the contamination was localized to the west and south of the warehouse with little or no contamination occurring to the east of the site.

Soil was then collected from fourteen locations at depths of 0, 2, 4, 7 and 12 feet below the surface on a triangular grid across the tank farm area. Samples were taken by the split spoon technique using a hollow stem auger drill rig, and analyses were performed in accordance with EPA procedure #8040 (SW-846). Contaminant contour maps were developed from the data which showed a maximum PCP concentration of 26,500 ppm at the surface in the area where the loading of trucks had occurred. This finding of soil contamination caused an increase of the site size to about 70' x 140'. A second focus of contamination was at the southwest corner of the warehouse. The vertical column of contamination at the second location extended to the lowest sampling interval (12-14 feet below the surface), which was noted as being in the saturated zone at the time of sampling. The highest concentration at this depth was 2,030 ppm.

The two focal points of contamination are indicated on the surface contour isopleth map generated by Riedel and presented as Figure I-1 of this report. Figure I-2 indicates the 12 foot contaminant isopleth. (Note: the southwest corner of the warehouse is indicated by the reference mark at coordinates (76.166)).

#### 600 ppm Chlorophenol Toxicity Level Interpretation (June, 1985)

On June 28, 1985, Time received a letter from the DEQ laboratory, concerning previous interpretations by the agency, that 600 ppm of total chlorophenols in soil represented the hazardous waste threshold. This conclusion was based on extraction and bio-toxicity tests performed by DEQ. The letter stated, however, that this was only used as guidance and did not necessarily reflect specific clean up requirements.

#### Removal of Concrete Wall (November, 1985)

Time retained Riedel Environmental Services in November, 1985 to remove and decontaminate a concrete wall which stood along the west perimeter of the woodtreating chemicals tank farm area. The intent of the removal of the wall was to allow for easy sample analysis, contaminant containment and future removal of the contaminated soil adjacent to the wall. This project included wall steam cleaning, subsequent testing of the wall for residual PCP and wall demolition following certification of decontamination to background levels of PCP. The wall was broken into pieces by Riedel and disposed of by Time.

#### Classification of Contaminated Soil as Hazardous Waste (December, 1985)

On December 10, 1985, the EPA Region X office advised Time that soil contaminated with leaked PCP had been reclassified (from U242

to a hazardous waste bearing number F027. Referring to a moratorium on landfilling of such wastes, the EPA letter stated that at that time there were "no commercial hazardous waste facilities in the United States that would accept waste designated as F027." EPA also suggested that Time consult with the DEQ before continuing with clean-up operations at the site.

#### Wells 1, 2, 3 and 4 Installation (November, 1985)

Pending resolution of acceptable disposal techniques for contaminated soil containing PCP, Time concentrated on determination of possible groundwater contamination.

In November, 1985, Time again retained Riedel Environmental Services to install four groundwater monitoring wells near the southwest corner of the warehouse building. Wells 1, 2 and 3 were placed in 16-inch (O.D.) 45° slant borings which penetrated soil beneath the building to a vertical depth of 14 feet. Well 4 was installed in a 16-inch (O.D.) vertical hole drilled to a depth of 50 feet. Samples for PCP analysis were taken to advance and further earlier analyses, particularly to determine if contamination existed beneath the woodtreating chemicals warehouse.

Samples from the slant borings indicated PCP concentrations as high as 116,000 ppm at 2.5 to 4 feet below the surface, with surface concentrations ranging from 65.3 to 1,690 ppm. The concentrations generally decreased with depth. The vertical boring (Well #4) showed concentrations decreasing with depth from 574 ppm at 18.5 to 20 feet below the soil surface to a low of 1.59 ppm at 43.5 to 45 feet below the surface. The conclusion of this report was that contamination exists below the southwest corner of the woodtreating warehouse floor, although the horizontal limits of contamination were not definable with the existing data.

Geologic logging of the soil at Well #4 indicated a minor layer of low permeability about 18 to 35 feet below the surface. The well was completed by installing 4-inch PVC well casing and screen to a depth of 40 feet in the 16-inch auger hole and sand packing the well annulus to within 6 feet of the surface. A well construction diagram is shown in Figure I-3. The geologic log of this boring is shown in Figure I-4. A well construction diagram of the slant borings is shown in Figure I-5.

#### Installation of Well Points (February - May, 1986)

In February, 1986, in order to identify groundwater flow direction and gradient beneath the Northwest Terminal facility, Time installed well points at three locations surrounding the woodtreating chemicals warehouse and tank farm area. Two of the wells (A and B) were installed to a depth of 20 feet. Two wells were installed at a depth of 8 feet at location C (see Figure I-6).

Water level measurements were taken on nine occasions between February 28 and March 11 in Wells A, B, C<sub>1</sub>, C<sub>2</sub> and 4. The data collected indicated an unexpectedly lower water level in well 4 as compared with the other well locations.

To further investigate this unusual circumstance, three additional well points, four observation pits and a river level reference point were installed by Time in late March, 1986. Wells E and F were driven to depths of 20 and 19 feet, respectively, while Well G was driven to a depth of 13 feet where advancement of the point was halted by cobbles. Well C<sub>2</sub> was removed, and Well C<sub>1</sub> was henceforth known simply as Well C. Water levels in Well 4 and Wells A-G were again measured repeatedly over a period of several days. The data confirmed earlier indications that a water table depression existed in the area of Well 4.

A detailed evaluation of the boring log data for Well 4 showed that a series of clay lenses and silty sands had been penetrated by the bore hole between the depths of 18.5 and 35 feet.

Gravelly sand lies above this zone and medium to fine sand predominates below it. The clay lenses appear to have formed a zone of relatively low permeability separating a perched upper water bearing zone from a lower aquifer. This zone of low permeability was apparently breached by the installation of Well 4. The boring was drilled with a 16-inch diameter auger while the well consisted of 4-inch PVC pipe. The annulus was filled with coarse sand, violating the integrity of the low permeability layer and providing a potential pathway for water from the upper perched water bearing zone to flow down the hole to the lower aquifer creating a depression in the natural groundwater flow. This appeared to have altered the natural direction of groundwater flow (toward the Willamette River) within a zone of influence surrounding Well 4.

Although the observed water table depression could represent a strong, natural vertical gradient in the vicinity of Well 4, the influence of this well on adjacent wells indicated a strong probability of an induced groundwater sink caused by an unsealed annulus of Well 4. This conclusion was reached by Time upon evaluation of the piezometric surface of the perched water, which indicated that wells in close proximity to Well 4 were apparently influenced by Well 4, showing water level depressions, while wells distant from Well 4 were unaffected.

#### Additional Groundwater Monitoring Wells and Well 4 Abandonment (May, 1986)

At Time's direction, three additional groundwater monitoring wells (D, H and I) were installed by Riedel in early May, 1986. The purpose of these wells was to further define the upper piezometric surface and to obtain data on groundwater quality.

In an effort to reinstate natural groundwater flow patterns in the area and to eliminate possible intercommunication between upper and lower water bearing zones, Well 4 was removed by overdrilling and the hole sealed on May 14, 1986. Prior to choosing this method of abandonment, Time evaluated several possibilities, including pressure grouting and two different overdrilling processes, with input from Hart Crowser and Associates, Century Environmental Sciences and Riedel.

#### Groundwater Sampling (April - May, 1986)

Time retained Century Environmental Sciences to perform groundwater sampling and analysis of the wells and well points at the Northwest Terminal facility. In April, 1986, Century measured static water levels in Well 4, in Wells A-C and Wells E-G. These measurements again showed that the water level in Well 4 was lower than in surrounding wells. Samples collected from each well were analyzed and .0061 ppm, .0026 ppm and .0014 ppm of PCP were detected in Wells 4, B and F, respectively.

On May 28, following abandonment of Well 4, a second group of groundwater samples were collected from Wells A, B, D, E, F, H and I. The locations of these wells is indicated in Figure 6. The analytical results showed PCP in a concentration just slightly above the detection level (.0002 ppm) in Well I. Other wells contained no detectable levels of PCP.

#### Additional Soil and Groundwater Sampling (August, 1986)

In August, 1986, Time retained SRH Associates to perform additional sampling and analysis of soil and groundwater at the Northwest Terminal facility. Based on previous contour map determinations, Time re-graded the surface of the woodtreating chemicals tank farm area, gathering all suspected contaminated surface soil in a centralized area, reducing the area to about 60' x 60'. SRH then collected surface soil samples from the same 14 locations in the tank farm area which had been sampled earlier by Riedel, drilled six holes through the warehouse floor and sampled soil from beneath the building. Samples were collected from the surface of the soil underlying the concrete floor of the warehouse as well as the same five subsurface intervals sampled by Riedel in 1985. These borings were made in an effort to determine the extent of contamination underlying the warehouse.

SRH also collected groundwater samples for PCP analysis and pH, and made measurements of static water levels from all monitoring wells in existence. The results of these analyses are supplied in Section III of this report.

## SUMMARY

During the duration of the agreement between Time and Koppers, pentachlorophenol and probably some tetrachlorophenol were released into the sandy soil adjacent to the woodtreating chemical warehouse. This material may have been released in combination with various hydrocarbon solvents used as a part of the process. The primary cause for these releases appears to have been intermittent spillage from hoses and mixing vessels during end product formulation and transfer operations, rather than a one-time spill event.

Upon investigation of these findings, Time and Koppers terminated their agreement, ceased all pentachlorophenol operations and began clean up operations at the site.

In investigating the extent of soil contamination, Time has obtained assistance from several consulting firms and clean up contractors, and has analyzed sufficient soil samples to determine the vertical and horizontal extent of contamination. The contamination is localized in the northwest corner of the woodtreating chemicals tank farm, with some slight penetration below the warehouse. An estimated 2,000 cubic yards of soil, a portion of which extends down to the first water bearing zone, is contaminated.

Time has installed an extensive water well monitoring network at the site and is continuously acquiring data on the flow directions and rates of flow of the first water bearing zone, as well as on water quality and PCP concentrations. Early data indicates that gross contamination of the groundwater has not occurred outside of the contaminated zone. PCP can barely be detected in wells in, or immediately adjacent to, the contaminant zone. Groundwater flow is generally in the direction of the Willametter River. Vertical gradients in the vicinity of the contaminant zone have not been determined at this time.

Time attempted to minimize the risk of contaminant migration by disposing of some material at Chemical Waste Management's Arlington facility. This effort was thwarted due to a moratorium on landfilling of PCP subsequently disallowing further such disposal. Time has consolidated the bulk of the contaminated soil into one spot within the woodtreating chemicals tank farm area to facilitate containment and minimize the risk of off-site migration.

Time has now retained SRH Associates to identify available alternatives to destroy or immobilize the PCP contaminated soil and is presently evaluating additionally generated data regarding groundwater quality and soil contamination.



## SECTION II

### REMEDIAL ALTERNATIVE ASSESSMENT

#### INTRODUCTION

A small portion of Time's 45-acre property at 12005 N. Burgard Road in Portland, Oregon has been identified as being contaminated with pentachlorophenol (PCP). Contamination at this site has been found to extend to approximately 70' x 140' in area and to depths of about 15 feet below the surface in one spot. The site was used for the formulation and storage of woodtreating chemicals under an agreement between Time and Koppers from 1967 until 1982. In addition to pentachlorophenol, a number of hydrocarbon solvents and petroleum products were used in this process.

Concentrations of PCP, ranging from below detectable limits to 116,000 ppm, have been detected in the soil, with concentrations generally decreasing with depth and distance from the southwest corner of the woodtreating chemicals warehouse. Concentration data has been used to generate equiconcentration isopleths which indicate that soil contamination is generally restricted to the upper 3 feet of soil, with the exception of a major vertical column of contamination located at the corner of the warehouse.

Perched groundwater underlies the site at a depth of approximately 13 feet below the surface. This water appears to be continuous with and potentially discharging to, the Willamette River. The surface soil consists predominantly of medium-grained sands with occasional minor clay lenses and/or gravels. The soil is characteristically homogeneous from the surface to the perched water table. A layer of somewhat lower permeability underlies the perched water and consists of silty sands with clay lenses. Fine-grained sands predominate below this layer.

Concentrations of PCP in groundwater below the known contaminated zone have not exceeded .044 ppm. Most wells indicate no detectable concentrations of PCP, and outside of the contaminated zone, concentrations have not exceeded .003 ppm in any well. Contamination does not appear to have migrated extensively from the known contaminated zone. Analyses of groundwater are continuing on a quarterly basis.

A water well monitoring network consisting of shallow wells and well points has been installed to monitor the upper perched water. A total of nine vertical and three slanted (45°) wells have been installed and are regularly sampled for pH and PCP plus being measured for static water levels.

Time is concerned with potential off-site migration of PCP from this source and is determined to eliminate this risk by remediating the site. Due to an existing ban on the land disposal of soil containing pentachlorophenol, excavation and landfilling is not an available remediation alternative (the material at Time has recently been designated by the EPA as RCRA-listed waste F027, vs. its previous U242 designation). Time does not desire to either leave the material in place without corrective action, cap the contaminated area without first eliminating the contamination or excavate and store the waste on site due to the long-term risks associated with these alternatives. Time has performed emergency phase stabilization and containment measures to minimize the risks of contaminant migration.

The following discussion identifies and describes several remedial alternatives which are potentially capable of destroying or immobilizing PCP in sandy soils such as those found at Time. Comments are made regarding soil and groundwater treatment, economics, availability and technical feasibility. This discussion is not intended to represent an indepth feasibility analysis of remediation options, but rather presents a summary review of options which Time may wish to investigate in greater detail.

## ALTERNATIVES

The following alternatives were identified during the preliminary evaluation as remedial methods potentially capable of achieving effective results at Time:

- Adsorption onto Polymers or Activated Carbon
- Biodegradation
- Capping in Place
- Chemical Reduction
- Closure in Place with Monitoring (No Remedial Actions)
- Encapsulation
- Excavation and Disposal
- High Temperature, Catalyzed Oxidation
- Incineration
- In-Situ Soil Washing and Surface-Mounted Soil Washing
- In-Situ Thermal Extraction and Surface-Mounted Thermal Extraction
- Sodium Dehalogenation

Of these listed alternatives, excavation and disposal, capping in place, and closure in place are either unavailable due to the regulatory moratorium on landfilling of F027 material, or do not satisfy Time's requirements for long-term risk reduction. The remaining alternatives are discussed below.

### Adsorption Onto Polymers or Activated Carbon

Should contaminating PCP, at some point, be removed from the soil by soil washing, thermal extraction or other processes, final treatment of the recovered wastes will be required. Although not a destructive process, sorption of the recovered PCP onto carbon or other polymeric substrates utilizing hydrophobic interactions as a sorptive process, will reduce the volume of PCP contaminated material.

Activated carbon and a variety of organic and siliceous polymeric adsorbents have been utilized to bind PCP and other phenols. The sorptive process, however, is usually reversible under appropriate conditions (usually temperature elevation or through the use of non-polar solvents) and therefore may not be suitable for long term stabilization of PCP wastes under uncontrolled conditions.

These sorbents may be used to concentrate PCP from a waste stream (i.e. soil washing eluates or thermal extraction scrubber liquors) which could then be recycled or disposed of as a non-hazardous waste. The adsorbent may then be regenerated for reuse and the concentrated PCP solutions so generated, collected for disposal by destructive methods such as incineration or chemical decomposition. Such an approach may be a logical consideration for the Time site.

### Biodegradation

Biodegradation of man-made compounds has been observed for many years and the results of aerobic sewage treatment systems have been documented in detail. Aerobic landfarming of oily wastes from the petroleum industry has also been in general use for years. Biodegradation occurs under essentially two basic conditions: aerobic (respiratory) and anaerobic (fermentative). Many compounds have been observed to be degraded, either partially or completely to carbon dioxide and water, by one or both of these pathways.

Pentachlorophenol has been observed to undergo degradation by bacteria and fungi. Although PCP degradation has been observed under aerobic conditions, it occurs at a more rapid rate and with fewer complications under anaerobic conditions.

In addition to the biodegradation of pentachlorophenol in soil, it has been documented that fungal enzymes promote the binding of PCP to humic acids in soils, resulting in immobilization of the PCP.

Bench scale studies by SRH Associates scientists have indicated that, under controlled conditions, PCP can be degraded in both aerobic and anaerobic soil environments. Controlling conditions for biodegradation include soil porosity, pH, moisture content, inorganic nutrients (including nitrogen, phosphorus and potassium,

Eh (oxidation reduction potential), microbial populations and PCP concentrations. Elevated concentrations of PCP are inhibitory or toxic to microbial populations, even under conditions of acclimatization.

The application of biodegradation to the treatment of soils from the site is severely limited due to the existence of high concentration material. PCP degradation, even under optimal conditions, ceases when PCP concentrations are in excess of 1000 ppm. Typically 500 ppm is considered the maximum effective limit. Between 500 and 1000 ppm, degradation effectiveness decreases. Since some material at the site contains PCP in excess of 1000 ppm, not all of the material would be considered amenable to this treatment without significant dilution or pretreatment to reduce the contaminant concentrations. A large amount of the soil contains PCP at low concentrations however and may be treatable if it can be successfully isolated from the high concentration material found nearby.

Biodegradation may be performed either in-situ or in surface-mounted fermentation reactors. Due to the highly permeable soil at Time, the shallow groundwater table and the possible adsorption of PCP in co-contaminating hydrocarbons which tend to immobilize the PCP, in-situ degradation is considered to present an excessive risk of PCP migration to off-site locations. Additionally, generation of anaerobic conditions in sandy soils is highly difficult. Should a biological process be initiated in-situ, significant risk of PCP mobilization through partial decomposition, preferential degradation of stabilizing hydrocarbon absorbents, or bio-emulsification of the PCP could be expected. For these reasons a surface-mounted fermenter would be the preferred method for soil treatment at the site.

A surface reactor may be used to directly treat a soil/water suspension, or may be used to treat extracted and diluted contaminants removed from the soil by other technologies. A surface fermenter allows for control of pH, nutrients, Eh, and other critical parameters, as well as preventing the release and migration of waste or waste products.

Nutrients, pH and Eh control are parameters that are easily controlled once optimal process conditions have been identified by bench and pilot scale studies. Co-metabolites or other nutrient augmentation is also easily regulated. Fermenters capable of handling soils such as those found at Time are commercially available, but may be constructed on site for considerable less cost. The requirements of this equipment vary with the amount of material to be treated, the reaction kinetics and the degree of control required.

Much debate currently exists over the benefits obtained by using PCP acclimated, commercially available bacterial preparations to promote degradation vs. using cultures of indigenous bacteria obtained from the site. There is considerable evidence to support

the use of indigenous microorganisms. The effect on the overall cost of the project is similar for both methods. Effective preparations range from \$20 to \$50 per pound of material. Microbial requirements depend on a variety of soil and waste-specific parameters that have not yet been determined at the site.

Costs not directly associated with the on-site remediation include bench and pilot scale tests, engineering, permitting, chemical, biological and physical analyses, agency negotiations, waste delisting and management. These costs are expected to be similar for all of the alternative technologies evaluated here.

### Chemical Reduction

Oxidation and reduction reactions have been utilized to destroy organic wastes under a variety of circumstances. Due to its high degree of chlorination, PCP is not readily oxidized by such mild oxidants as ozone or hydrogen peroxide. Stronger oxidants present such a great hazard in and of themselves as to be unsuitable for treating wastes (See High Temperature Catalyzed Oxidation).

PCP is, however, readily reduced by sodium borohydride solutions. Staiff (1981) and Sweeney (1981) have both demonstrated the use of catalyzed metal powders and/or borohydride solutions in the oxidation of chlorinated aryls. In-situ techniques have been demonstrated, however competition from reducible soil components may severely limit the reaction, requiring retreatment. This soil reduction chemistry must be identified to allow for proper selection and application of reducing agents.

Reduction, either in-situ or in surface-mounted reactors, has realistic potential for remediating the contamination at Time. The low organic content of the naturally occurring sands in the area, their homogeneity, the low trafficability of the soil, and the nature of the contaminants all support this alternative. Bench and pilot analyses would be required to determine the reduction potential and the products of reduction formed by this process. If technically successful, implementation costs should be moderate.

### Encapsulation

One method of encapsulation of organic material is through the application of sorbents to the contaminated soil. Sorbents may include carbon granules, polymeric materials or substances in which the waste is soluble. All sorbents must be insoluble in water, inert and not readily degradable in order to achieve long term stabilization of the wastes in question.

Pentachlorophenol is readily adsorbed by activated carbon granules and is soluble (absorbed) in a variety of organic substances including high molecular weight hydrocarbons such as tar or asphalt. Since both of these materials meet the criteria listed above for acceptable sorbents, they offer a feasible alternative for PCP immobilization. Additionally, both materials are capable of sorbing any petroleum hydrocarbons which may exist in the soil in addition to PCP.

An attractive alternative for immobilization of Time's wastes is the admixing of the PCP contaminated soil with asphalt to form a structurally sound paving material which could then be used to seal the soil surface in the vicinity of the woodtreating chemicals tank farm. This alternative would require an analysis of the leachability of the wastes from the surfacing material and a determination of the structural integrity of the asphalt so produced at various levels of waste incorporation.

#### High Temperature, Catalyzed Oxidation

PCP is not ordinarily oxidized by readily available, easily handled oxidizers such as ozone or hydrogen peroxide. Although permanganate, dichromate or other strong oxidizers have been reported to successfully oxidize PCP, their cost, side reactions with soil components, and the environmental hazards generated by them restrict their use in treating contaminated soils. Zimpro has developed a process, commonly referred to as wet air oxidation, which has been successful in destroying phenols and other hazardous compounds in aqueous media.

The Zimpro, Wetox and other processes based on this same principle, employ high temperature and elevated pressures in an oxygen enriched aqueous environment to oxidize and thereby destroy hazardous organics. PCP and other extensively chlorinated organics are refractile to this process without the addition of suitable catalysts which can facilitate the dechlorination of these compounds, rendering them retreatable. Once dechlorinated, the resulting intermediates have increased susceptibility to oxidation by the wet air oxidation process and are degraded to either carbon dioxide and water or to non-toxic biodegradable intermediates.

All wet air oxidation processes are provided as packaged systems by the supplier. Included are the reactor, reagents and operators. Additional support and feasibility testing of representative media can ordinarily be negotiated. Cost of the system, which is provided on a lease basis, is variable dependent upon the volume of material to be treated, the size of the required reactor and the type of process necessary.

## Incineration

Incineration represents a tested and proven method for the destruction of chlorinated hazardous wastes, including PCP. Several types of incineration capacity exist in the U.S. Ordinary incineration, which is not acceptable for chlorinated organics, does not incorporate the appropriate acid scrubbers needed to produce an acceptable air discharge from wastes such as PCP. High efficiency incinerators, (often referred to as "6 nine" incinerators, based on their destruction and removal efficiencies) are capable of treating pentachlorophenol in high concentrations. Incinerators of this type are available in the U.S. as both fixed and mobile units. However, there is not sufficient capacity at this time in either type of unit, to satisfy domestic demands. Although most incinerators can handle liquids, few are equipped to handle solids such as contaminated soil.

Incineration can easily satisfy Time's objectives of reducing long term risk related to the contamination found on site. However, since no small mobile units are available nearby, Time must either absorb significant mobilization, siting and permitting costs or ship its waste to a fixed unit. The attendant risks in shipping must be weighed against those associated with leaving the soil on site.

The nearest incinerator for solid hazardous wastes such as those at the Time facility, is located in Deer Park, TX and is operated by Rollins Environmental. A primary concern with disposal by this alternative is cost. Rollins current price for incineration of contaminated soils is approximately \$0.50 per pound. Based on Time's estimate of 2000 cubic yards of contaminated soil, incineration costs may approach \$2.5 million. This figure does not include excavation, shipping and other associated costs. For comparison purposes, this amount is on the order of five times the cost of landfilling, if this alternative were available to Time.

## In-Situ Soil Washing and Surface Mounted Soil Washing

Removal of contaminants from soil may be accomplished through extraction with a variety of elutriating solutions. The choice of the proper solution must be based on the physico-chemical nature of the contaminants, the effect of the elutriate on the soil geochemistry and its permeability, plus the method by which the eluted contaminants are to be treated for destruction or disposal. Ordinarily, aqueous solutions of acids, bases, surfactants or other compounds are selected (US EPA, 1982).

The effect of washing contaminated soils with water alone, or with mixtures of non-ionic surfactants was investigated by Science Applications International Corp. Their findings indicate that surfactants greatly increased the effectiveness of soil washing when the contaminant of concern was either PCP or a high boiling

oil fraction. With pentachlorophenol alone, or when used in conjunction with other chlorinated phenols, plain water provided effective washing of the contaminants from a relatively sandy soil (83% sand, 10% silt and clay).

Since the contaminants at Time initially appear to be refractile to natural elution with precipitation or groundwater, surfactants appear to be desirable at this site. The use of alkaline solutions, while ordinarily effective with phenols, may be ineffective at Time due to the possibility of co-contamination with oils or hydrocarbon solvents. Extraction with other hydrocarbon solvents, while likely to effectively extract the contaminating PCP from the soil, will result in the formation of a hydrocarbon contaminated soil requiring an additional purification step.

Two means of applying soil washing methodologies have been identified: in-situ techniques and surface-mounted techniques, (including batch or continuous flow apparatus). In-situ techniques involve the treatment of soil without excavation and provide for the application of the elutriating solvent to the soil surface and recovery of the eluate by using recovery wells in the treatment zone. Surface-mounted systems involve the use of batch extraction tanks or counter-current extraction columns which extract the contaminants under controlled conditions.

In-situ techniques are effective in extracting contaminants only where the soil geology is known to be uniform and where the permeability is high enough to permit adequate percolation of the elutriating solutions through the soil. Additionally, in cases where the distance from the lower limit of the contaminants to groundwater (or alternatively to either a natural or induced low permeability soil layer) is great, excessive amounts of solution are required. Control is reduced and the potential for uncontrolled release of the eluate is great. The technique is well suited for situations where contamination is not generally accessible by ordinary excavation techniques (i.e. below buildings, in developed or heavily utilized areas).

The in-situ process is generally implemented by applying the solution through trickle irrigation or infiltration galleries, and recovering the product through judiciously placed recovery wells. The recovered eluate is treated and, if possible, recycled. A thorough evaluation of all waste components and soil chemistry must be performed to facilitate the selection of a proper surfactant, determine application rates, evaluate recovery potential and to provide information regarding eluate characteristics for the determination of treatment alternatives.

Surface mounted processes are indicated where the distance to groundwater, extraction requirements or heterogeneity of the soil (i.e. channelling, lenses, etc.) require a higher degree of control on the process. In these cases, soil is excavated by suitable procedures and placed into batch or countercurrent continuous extractors. Batch extractors usually involve the



submersion and agitation of batches of contaminated soil in large tanks fitted with a filtration stage to separate the cleaned soil from the eluate. This step is usually repeated until a suitable clean-up standard is achieved.

Countercurrent extractors involve the introduction of contaminated soil into an upwardly moving extraction bed while the elutriating solution is introduced at the top of the bed and allowed to migrate downwards. In this latter process, the cleanest soil (already partially extracted) contacts the cleanest solvent just prior to exiting the column at the top. This continuous process has the advantage of generating less spent solvent requiring subsequent treatment than does the batch process. It requires a higher degree of process control but is generally less labor and energy intensive than a batch process. A continuous process also allows for the fitting of a second solvent stage to elute any residual surfactant from the treated soil where water was used.

The cost of soil washing is expected to be moderate, however this process does not address the final destruction and/or disposal of the recovered solutions. These solutions, containing PCP, water, surfactants, and possibly hydrocarbons, must be treated by incineration, biodegradation, immobilization, recycling or by chemical processes prior to completion of the project. The extraction process and the treatment process should be determined in conjunction with one another in order to maximize their mutual effectiveness.

#### In-Situ Thermal Extraction and Surface Mounted Thermal Extraction

Thermal extraction processes involve the introduction of heat to the contaminated soil mass to increase the vapor pressure of the contaminants, rendering them sufficiently volatile to allow their recovery as a vapor. As might be expected, these processes work best with relatively volatile contaminants that tend to remain free, rather than binding to soil components. Additionally, the processes work best in friable or loose-grained soils which allow free permeation of the vapors and their subsequent release to the recovery system.

Coia (1985) has presented a system for recovery of volatiles from contaminated soils using an in-situ process. This system consists of a network of thermal injection wells and extraction wells connected to injection and extraction blowers, respectively. Although the system was intended for extraction of TCE from glacial sands, any compound that can be brought to exert a significant vapor pressure can be recovered with this system.

A similar system utilizing a modified drilling rig has been developed by ATW Calweld. This firm, a manufacturer of drilling equipment has modified the kelly of a drilling rig to incorporate several channels which allow the introduction of hot air, steam and various chemicals, if appropriate. The equipment rapidly

agitates the soil while applying heat and volatilizes contaminants which are then recovered in a negative pressure hood surrounding the surface of the rig. Contaminant vapors are drawn off to a cyclone and scrubber system. Although the device has only been demonstrated on hydrocarbon spills (gasoline and diesel oil), A. Calweld suggests that the process is applicable to lower volatility compounds such as pentachlorophenol.

Thermal extraction in surface units has been advanced by several firms. American Toxic Disposal in Waukegan Illinois, has operated a 10-ton-per-day unit which has successfully removed PCB's from contaminated soils and sludges. This system has been demonstrated to the EPA and is currently being used to treat material containing PCB's in Gary, Indiana.

As with soil washing techniques, thermal extraction techniques do not destroy contaminants, which must be recovered and treated or immobilized by other techniques. The process does, however, result in a volumetric reduction of the contaminated soil by 10 to 100 fold, allowing consideration of incineration as a final destruction alternative.

Thermal extraction processes are viable candidates for treating Time's contaminated soils since the soil at Time is friable and loose-grained. A preliminary consideration to be addressed before selecting this process is the degree of volatility of the contaminants in the matrix found at Time. Since moisture does not present a major deterrent to thermal processes, saturated material may also be successfully treated.

#### Sodium Dehalogenation

Both Acurex and the Franklin Institute have developed processes whereby soils are extracted (similar to Soil Washing, above) and subjected to dehalogenation using sodium based proprietary compounds. Although the process has been primarily utilized for PCB destruction, it appears to be amenable to chlorinated phenols as well.

The Acurex process is less stable and more sensitive to interference from water than is the Franklin Institute process, which uses a specially modified sodium/polyethylene glycol complex. The Franklin Institute process has been applied directly to soils in an in-situ operation.

These procedures have been used primarily in the destruction of PCB oils and have only recently been used to treat contaminated soils. PCP has not been treated by this process. Adaptation to the Time site may be possible but should be pursued only if other demonstrated technologies do not prove successful in pilot demonstrations.

## SUMMARY

Twelve alternative processes have been identified for isolation, immobilization, separation and/or destruction of PCP contaminated soil found at Time. The selection of any one or a combination of these alternatives requires additional characterization of the wastes found at the site. Among the additional data that may be required are:

- Adsorption Isotherms of Wastes on Soil and Carbon
- Biodegradability of Waste Constituents (Half-life and Rate Constant)
- Biodegradation Products
- Bioinhibition Threshold Concentration of Waste Constituents
- Characterization of Co-contaminants (if any)
- Climatic Conditions
- Determination of Soil pH
- Determination of Soil Particle Size Distribution
- Groundwater Parameters (Flow Rates, Storage Coefficient)
- Organic Carbon and Octanol/Water Partition Coefficients of Waste Components
- Oxidation/Reduction Potentials of Waste Constituents
- Required Clean-up Levels
- Soil Microflora
- Soil Moisture Content
- Soil Nutrient Concentrations (N, P & K ratios)
- Soil Organic Matter
- Soil Oxygen Concentration
- Soil Permeability
- Soil Temperature
- Surfactant Solvation Efficiency (for Each Waste Constituent)
- Trafficability of Soil and Site
- Waste Constituent Vapor Pressure Curves

While other information may be needed for each specific alternative, some of the above data may also be necessary, depending on method selected.

It should be remembered that separatory procedures such as soil washing or thermal extraction will require additional disposal or destructive treatment processes as a final step. Surface mounted separatory or treatment processes will require excavation, containment and storage steps prior to implementation.

A recommended course of action for the determination and selection of a remedial technique for the Time site involves additional definition of the waste constituents, clarification of soil parameters, further definition of groundwater conditions and determination of site specific conditions listed above. Following

these determinations, the specific questions of technical feasibility of the various alternatives listed above can be addressed.

With this information, alternatives may then be selected with greater degree of confidence and further pursued by performing bench scale tests to evaluate their applicability to the contaminated soils found at Time. Bench scale conditions can then be scaled up to pilot level demonstrations, either on-site or at supplier's test facilities. Finally, these data may then be used to develop and obtain required treatment permits from appropriate State/Federal agencies. The generally accepted approach to selecting an operational treatment procedure is to evaluate the most logical alternative first and if it proves unsatisfactory due to site specific or economic factors, evaluate the next logical option.

### RECOMMENDATIONS

Based on existing information, the following is recommended:

- a. Select the "Surface Mounted Soil Washing" technique as the most logical remedial approach.
- b. Perform bench scale and pilot level evaluations.
- c. Determine necessary destruction steps of recovered extracts.
- d. Ascertain technical permitting and economic feasibility of technique for final disposal action.
- e. Compare results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".

Bench scale evaluations of a surface mounted, countercurrent soil washing process involve the excavation of contaminated soils, temporary storage of the soils on an impervious slab, extraction of the contaminants with an aqueous solution of nonionic surfactants, removal of the surfactants by countercurrent washing with water, recovery and treatment of the rinsates, their analysis and on-site placement of the purified soils. The contaminated rinsates would then be subjected to a destruction step that can only be determined based on the constituents in the recovered extracts, but may include chemical reduction, incineration, biodegradation or other processes outlined earlier. A schematic drawing of a proposed process is shown in Figure II-1.

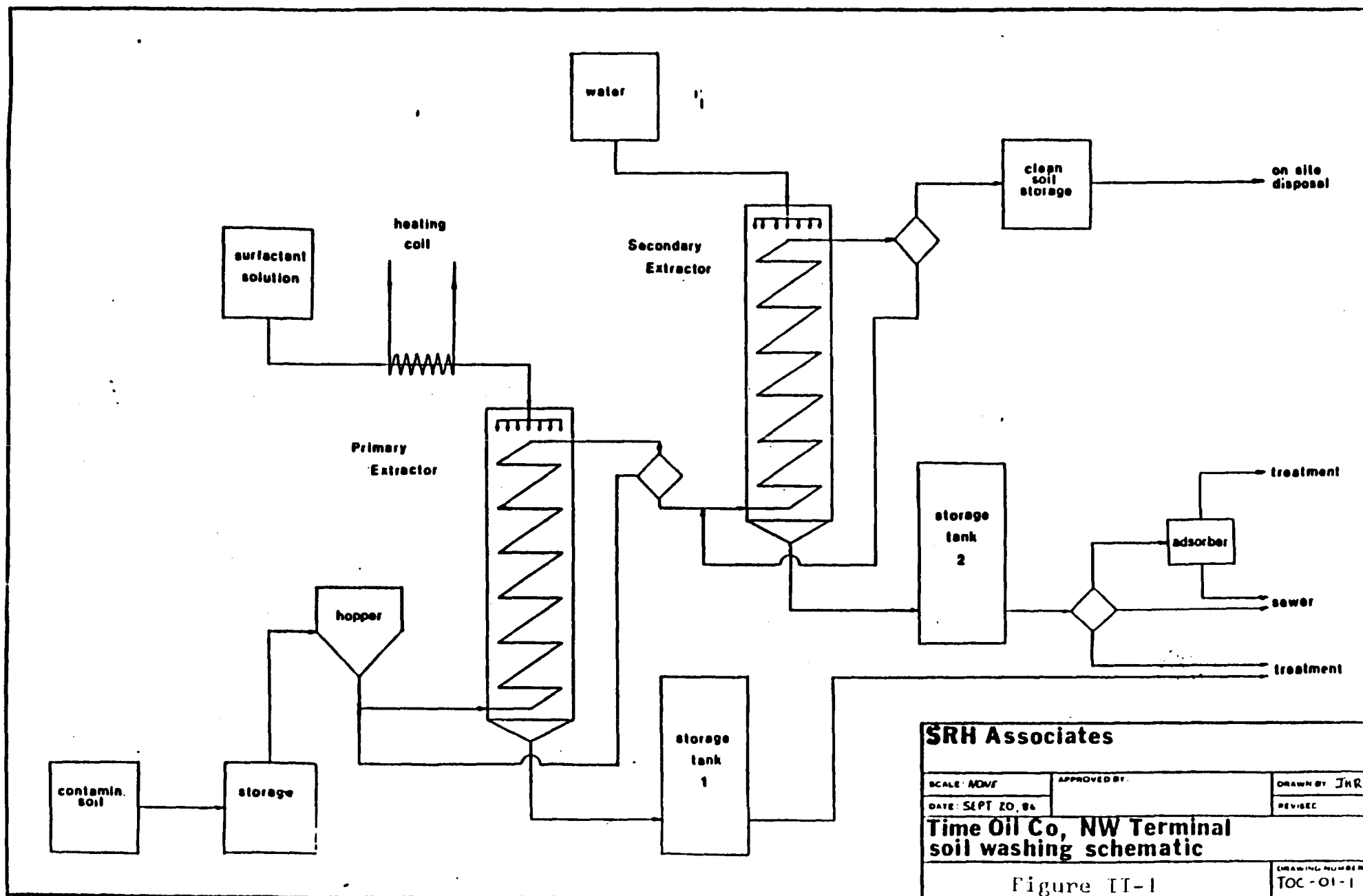
The actual process consists of the physical excavation of contaminated soil using classical techniques and the temporary storage of the excavated soils on an impervious, protected surface. Material from this location would be transferred to an infeed hopper connected to a primary extractor or soil washer. The soil would be introduced into the lower section of the extractor via a screw feed auger. Once in the extractor, the soil would be agitated and conveyed upwards while extracting solvent [an aqueous solution of nontoxic, nonionic detergents (surfactants)] is introduced into the top of the extractor. The extraction would take place in a countercurrent fashion, producing a cleaned soil product and contaminated elutriate in a continuous process.

Cleaned soil would then be subject to rinsing with clean water in a secondary extractor, operated similarly to the primary extractor, to reduce or eliminate residual surfactant concentrations, allowing the soil to be returned to the site. The contaminated fluids would be stored, tested and treated to effect ultimate disposal. Analytical decision points are noted as diamonds in Figure II-1. There are three. It is possible that surfactant solutions with suitably low or undetectable levels of PCP could be discharged to the sanitary sewer.

The process can easily be modelled in bench scale experiments and the technical feasibility of the process can be accurately determined. The nature and required concentrations of the surfactants, soil retention times, elution rates and contaminant loading factors can all be determined to allow approximation of full scale process operating parameters. Following determination of these parameters, scale up protocols and economic feasibility may accurately be determined.

Soil washing is recommended since it has been successfully applied to soils contaminated with PCP in pilot studies on similar soil types and does not use hazardous materials which may interact with or be retained by the soil. The process should be directed towards a surface, rather than in-situ technology to improve process control and to minimize the chance of uncontrolled releases to the environment. Residual surfactants may be eliminated from the soil using only water, and surfactants can be modified to remove PCP as well as co-contaminating hydrocarbons, which may also be present.

The aqueous extracts so produced may be subjected to a variety of concentrating and destructive steps to remove the entrained PCP and hydrocarbons, placing a wider array of treatment alternatives at Time's disposal.



# SRH Associates

SCALE: NONE	APPROVED BY:	DRAWN BY: JHR
DATE: SEPT 20, 86		REVISED:

Time Oil Co, NW Terminal  
soil washing schematic

Figure II-1

DRAWING NUMBER
TOC-01-1

## SECTION III

### ANALYSIS RESULTS

#### INTRODUCTION

During August of 1986, Time retained SRH Associates to collect samples of surface and subsurface soil and groundwater from the Time Facility located in Portland, Oregon. The samples were analyzed for pentachlorophenol (PCP) in an effort to further existing data concerning past releases of this chemical from a woodtreating chemicals formulating operation at this site.

Samples of surface soils were collected from an earthen tank farm area located south of the woodtreating chemicals warehouse and from six locations below the concrete floor of the warehouse itself. Additional samples were taken from five other depths below the warehouse floor from the same holes as the surface samples. Groundwater was sampled at seven existing monitoring wells surrounding the woodtreating chemicals area and was analyzed for PCP and pH. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations located on the Northwest Terminal Facility pier.

#### SURFACE SOIL SAMPLING AND ANALYSIS

Following the contaminated soil relocation to one pile, surface soils were collected from 17 locations in the woodtreating tank farm area. The locations were identical to those sampled by Riedel Environmental Services during initial samplings performed in 1985. Samples were obtained from 2 to 3 inches below the soil surface to reduce the risk of contamination arising during set up procedures at the sample site.

Additionally, six locations inside the warehouse were sampled by coring through the concrete with abrasive saws. The six locations were selected by Time and represent an extension of the triangular sampling grid employed by Riedel in the 1985 study. Samples were obtained from an interval of 3.5 to 5.5 feet below the lower

surface of the concrete using split spoon samplers. The sampling procedure used will be described in the next (Subsurface Samples) part. The selected depth was chosen to position the samples at the same true elevation as the surface samples taken from the tank farm area. Samples of soil from 2 to 6 inches below the low surface of the concrete floor were obtained and held for possible future analysis.

Samples were obtained using stainless steel sampling spoons which had been previously cleaned with sequential washings of laboratory detergent, tap water, hexane, tap water, trisodium phosphate and sodium carbonate in water, tap water and distilled water (3X). Samples were screened through 0.10 inch stainless steel mesh which had been similarly cleaned. The screened material was allowed to fall directly from the screens into pre-washed 8 ounce glass jars fitted with screw cap closures and teflon liners. The containers had been cleaned to EPA specifications and were not opened prior to receiving the sampled material.

Samples were field logged and containers were marked with the date, time, location, sample code, requested analyses and other relevant data. Lids were replaced with care being taken to ensure that no interference with the hermetic seal occurred. Tamper indicating seals were applied, chain of custody and analysis request forms were completed and the samples placed on ice prior to transport to the laboratory. Samples were delivered to the laboratory within 48 hours of collection in all cases. No preservatives were added to soil samples.

Samples were extracted in the laboratory using method number 354C Soxhlet Extraction, as described in EPA publication SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. The extract so obtained was analyzed for pentachlorophenol by method 8040, Phenols, as described in EPA publication SW 846. Field and laboratory duplicates were analyzed and spiked sample recovery efficiencies were determined. Laboratory blanks were analyzed. No field blanks of soil were submitted. All quality control results indicated acceptable performance of sampling and analysis.

The results of the surface soil samples are listed, along with the X and Y coordinates of their respective sampling locations, in Table III-1. The coordinates are referred to a temporary bench mark located at the end of a concrete wall at the southeast corner of the woodtreating tank farm area. The coordinates are given in feet. The X axis is aligned in an approximately northeast - southwest plane while the Y axis is aligned in an approximately northwest - southeast plane at at 90° to the X axis.

The results listed in Table III-1 were subjected to Kriging analysis to generate lines of equal concentration (equiconcentration isopleths). A .95 smoothing ratio and a search radius of 213 feet was used for generation of the contours which are shown in Figures III- 1 to III-4. The sample sites and their respective concentrations are indicated. The contours are t



scale (1" = 20 feet) and can be overlaid on the associated plan drawing of the sampled area. (Figure III-5).

The results indicate that the bulk of the surface contamination exists in a pile of material located in the vicinity of sample point S. Additional contamination is located to the east of point S, continuing to approximately the concrete wall bordering the tank farm on the east. The strong focal point of contamination located at point K has generated a broad area of calculated contamination on the Kriging generated contour maps. Due to the lack of supporting high concentrations of PCP adjacent to point K, it is concluded that this contour is primarily artifactual, generated by the data reducing program in response to the single very high concentration detected at K. It is more likely that K represents a small focus of high concentration, rather than the large area implied by the contours.

Most contamination that had been previously detected to the west of the woodtreating tank farm area appears to have been removed during recent excavation activities performed by Time. This is reflected by the low results found at points M and U.

Two locations beneath the warehouse floor were found to contain low levels of PCP. Borings 1 and 5 contained 5.7 and 1.4 ppm of PCP, respectively. It should be noted, however, that despite stringent efforts to prevent contamination, blowing winds and "dust devils" were noted during sampling and were observed picking up soil from the tank farm area and warehouse floor. Because of these concerns, the low levels noted in these samples are probably a result of field contamination.

#### SUBSURFACE SAMPLES

Samples were obtained from six depths below the lower surface of the concrete floor in the woodtreating chemicals warehouse. Six locations, determined by Time and located at extensions of the triangular sampling grid developed by Riedel, were sampled. The approximately 6 inch thick concrete floor was cored using an abrasive wheel. Twelve inch diameter holes were cut. The surface of the concrete within a 6 foot radius of the hole was swept clean and covered with .005 inch thick polyethylene film to minimize contamination from residue found in the warehouse.

The upper 2 to 3 inches of soil in the hole was removed to eliminate contamination with cuttings generated during the coring and set up operations. A sample was subsequently obtained using the technique given above, from the exposed surface of the hole. The holes were designated as numbers 1 through 6. The surface sample was collected and held for future analysis.

Following collection of the surface sample, the hole was advanced using a hand operated, 2 1/2 inch (O.D.) continuous flight auger. Samples were obtained at the following intervals below the upper surface of the concrete floor using a 2 inch (O.D.) split spoon sampler:

3.5 to	5.5 feet	( 0 )
5.5 to	7.5 feet	( 2 )
7.5 to	9.5 feet	( 4 )
10.5 to	12.5 feet	( 7 )
15.5 to	17.5 feet	( 12 )

Since the upper surface of the concrete floor was 3.5 feet above the surrounding soil surface, the five depths listed above were equivalent to the 0 to 2 foot, 2 to 4 foot, 4 to 6 foot, 7 to 9 foot and 12 to 14 foot intervals sampled in the woodtreating tank farm area by Riedel in 1985.

Samples were taken by removing the drill from the bore hole and inserting the split spoon sampler into the bore hole taking care not to dislodge any material from the surface or walls of the hole. The sampler was driven into the soil using a 20 lb. hammer. Hand drilling and driving of the penetrometer/sampler was required due to the inaccessibility of the site to conventional drill rigs and to the low overhanging roof of the warehouse.

Samples were extruded by gently tapping the soils out of the sampler onto stainless steel screens, which were cleaned as indicated above. The samples were screened, placed into jars, labelled, logged and handled as described above. Samplers were cleaned after each use, using the decontamination procedures described above. The drilling equipment was decontaminated between holes and prior to leaving the site. All decontamination water was impounded in D.O.T. 17 E drums until proper disposal requirements could be established based on analytical results.

During drilling, saturated conditions were encountered at the 12 foot interval in all holes. No groundwater samples were taken from any location. All soil samples consisted of medium grained grey - brown to blue sands. Cobbles were encountered in holes number 1 and 2 at a depth of approximately 3 feet below the floor surface. The cobbles were associated with a minor clay lens approximately 2 inches thick.

Following drilling, holes were abandoned through the addition of bentonite pellets to a depth of 13 feet below the concrete floor. The remainder of the hole was filled with bentonite grout to the surface. The concrete core plugs removed during coring of the warehouse floor were replaced in the hole and bedded with bentonite in accordance with Time's request.

The samples were refrigerated and shipped to the laboratory for PCP analysis as outlined above. The results, together with the X and Y coordinates of the sample points, are presented in Tables

III-1 through III-4. The data from these analyses have been combined with the results obtained by Riedel at the sample locations labelled J through Z in 1985, for the nominal sampling depths 2, 4, 7 and 12, to generate concentration isopleths at these depths.

The data listed in these tables was analyzed by Kriging analysis according to the procedure given above. The results of the contouring are shown in Figures III-1 through III-4. Figure III-5 shows the sample locations on a plan drawing of the woodtreating chemicals warehouse. Figure III-6 incorporates the X and Y coordinates of the sample locations on this drawing.

The results indicate that contamination is restricted to the woodtreating tank farm area with virtually no contamination being found beneath the central and northern portions of the warehouse. There is significant PCP contamination below the surface of the southwest corner of the warehouse, which appears to be continuous with a vertical column of contamination located immediately adjacent to this area in the tank farm.

Excavations in the woodtreating tank farm area have perturbed the original conditions of the site, and therefore the surface and 2 foot contours are not expected to be representative of conditions existing prior to the movement of soil. This can be seen by the distortion of the vertical column of contamination at the surface and two foot intervals, due to the fact that soil at these sites had been removed and replaced with soils from other areas within the woodtreating tank farm. A computer generated topographic grid net of the woodtreating tank farm and warehouse area can be seen in Figure III-7.

The 4, 7 and 12 foot contours reflect the strong vertical plume of PCP contamination which decreases to about 2000 ppm at the 12 foot depth. A minor lobe of this plume appears to extend to the southeast into the lower corner of the woodtreating tank farm area at or around the seven foot interval. The vertical plume appears to widen and diffuse to the south at the 12 foot contour, presumably due to the presence of groundwater at or near this sampling depth.

#### GROUNDWATER ANALYSES

The nine vertical groundwater monitoring points at Time (See Figure I-6, Section I) were measured for static water levels and tested for pH and PCP. The three slant borings located at the southwest corner of the warehouse were not examined. The wells, which had been previously installed by Time employees or other contractors, consist of 1 1/4 and 2 inch (I.D.) stainless steel well points and 2 inch (I.D.) PVC screen and casing.

The water level elevations in the wells, labelled A through I, were measured to the nearest .01 foot from the top edge of the casing at a scribed mark located on the north side of the casing. A Fisher M-Scope previously calibrated against a steel tape was used to obtain the measurements. Standing bore volumes of well water were calculated based on these measurements and well construction drawings provided by Time. A measurement of the Willamette River water elevation relative to a mark located by Time on its unloading pier was also taken.

Stainless steel weighted bailers were used to remove at least 4 standing bore volumes of water prior to collecting representative samples of groundwater. The bailers had been previously cleaned by the procedure described above, and were re-cleaned after each well was sampled. The purged water was collected into D.O.T. 17 E drums until proper disposal could be determined based on analytical results.

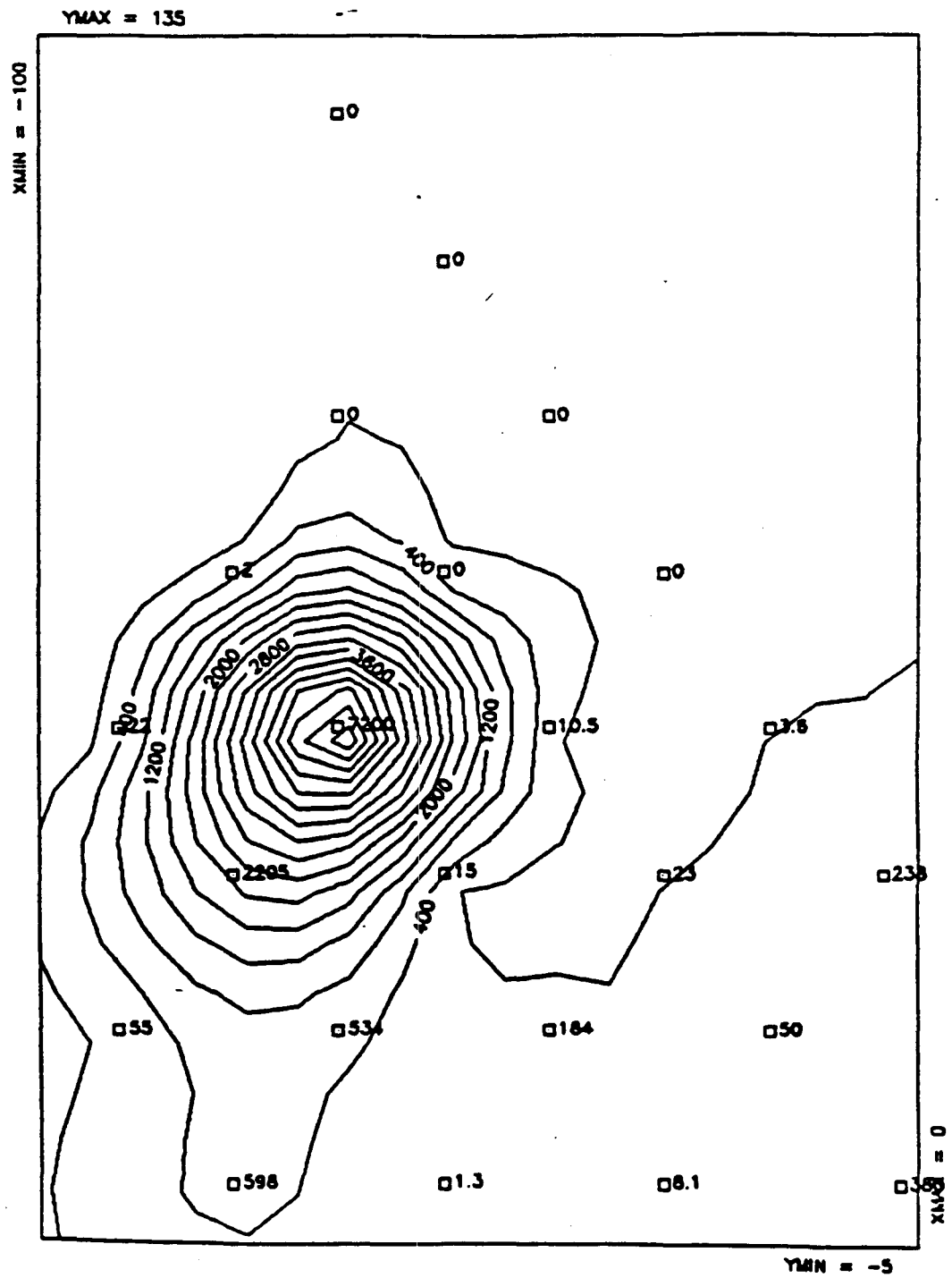
The samples were dispensed directly from the bailer into two 1 liter amber glass bottles fitted with screw cap closures and teflon liners for PCP analysis. Samples were adjusted to pH 2 with 1:1 Sulfuric Acid in distilled water and checked with pH paper prior to refrigeration and delivery to the lab. Samples for pH analyses were dispensed directly into 250 ml polyethylene wide mouthed bottles without preservatives. pH analyses were performed within 2 hours of sample collection using a silver-silver chloride reference electrode standardized against two NBS traceable reference buffer solutions. Samples were logged, labelled, sealed and transferred to the laboratory within 6 hours of collection. Analyses for PCP were performed as above, except that the sample was not filtered prior to analysis, and was extracted by method 3510, Separatory Funnel Liquid - Liquid Extraction, as described in EPA publication SW 846.

The results of the groundwater investigation are shown in Table III-6. Wells C and G were dry and could not be sampled. The pH ranged from 6.53 to 6.91. The only well showing detectable PCP was well D, in which .044 ppm was detected. Well D is located southeast of the woodtreating chemicals warehouse.

[illegible]

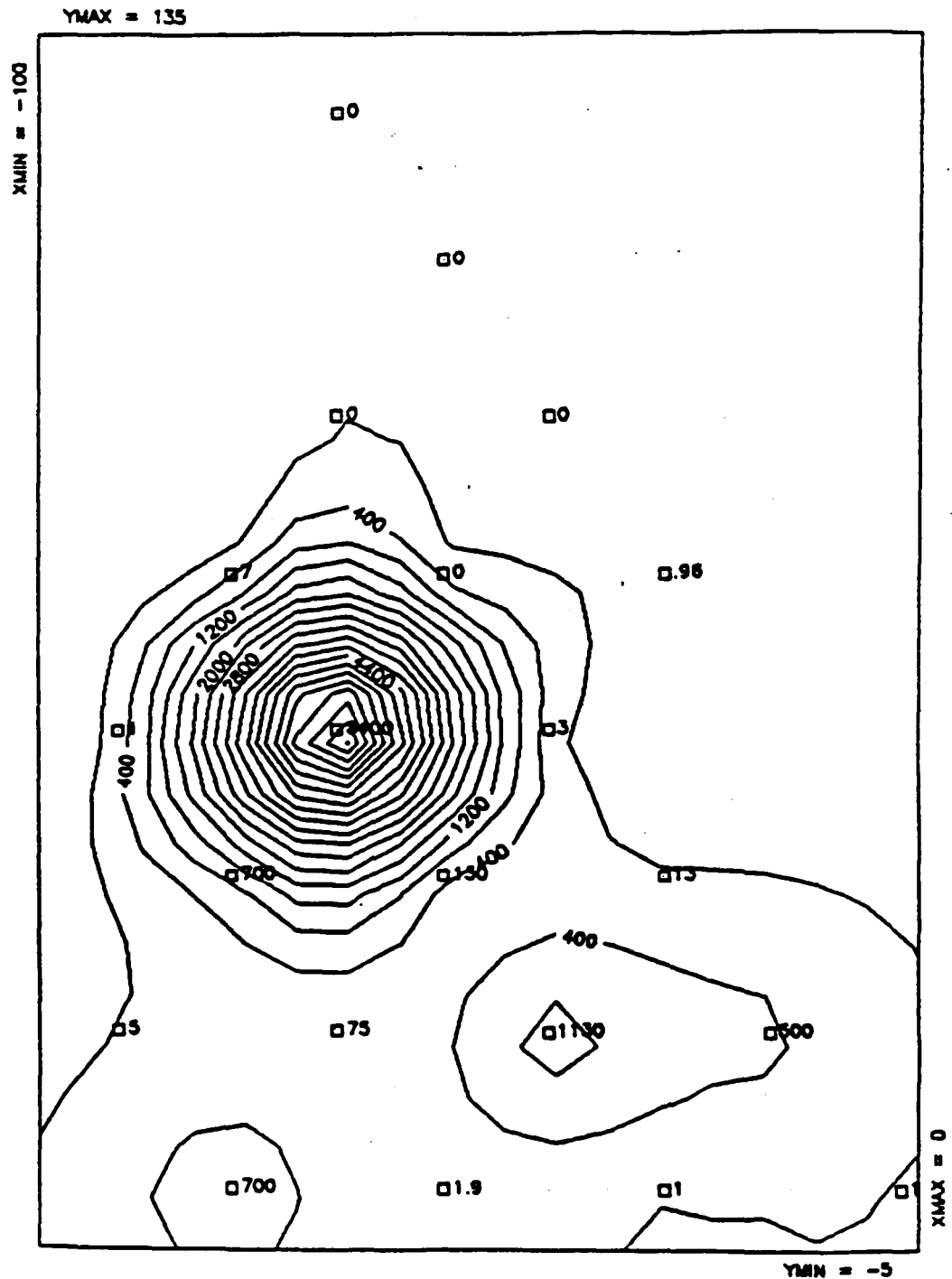
BZTO104(e)011409

FIGURE III- 2



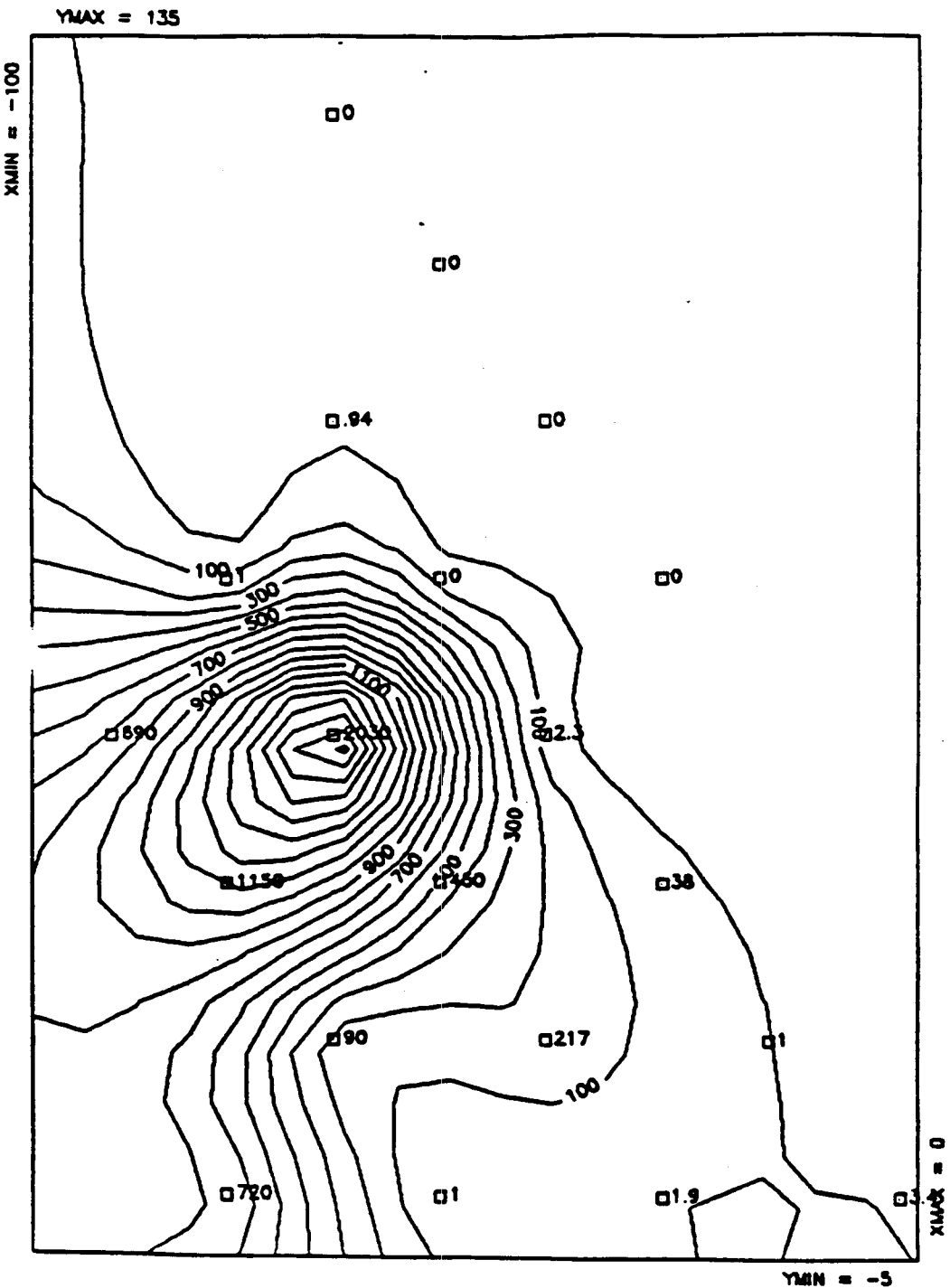
TIME OIL CO. - 4 FOOT PCP CONTOURS

FIGURE III- 3



TIME OIL CO. - 7 FOOT PCP CONTOURS

FIGURE III-4



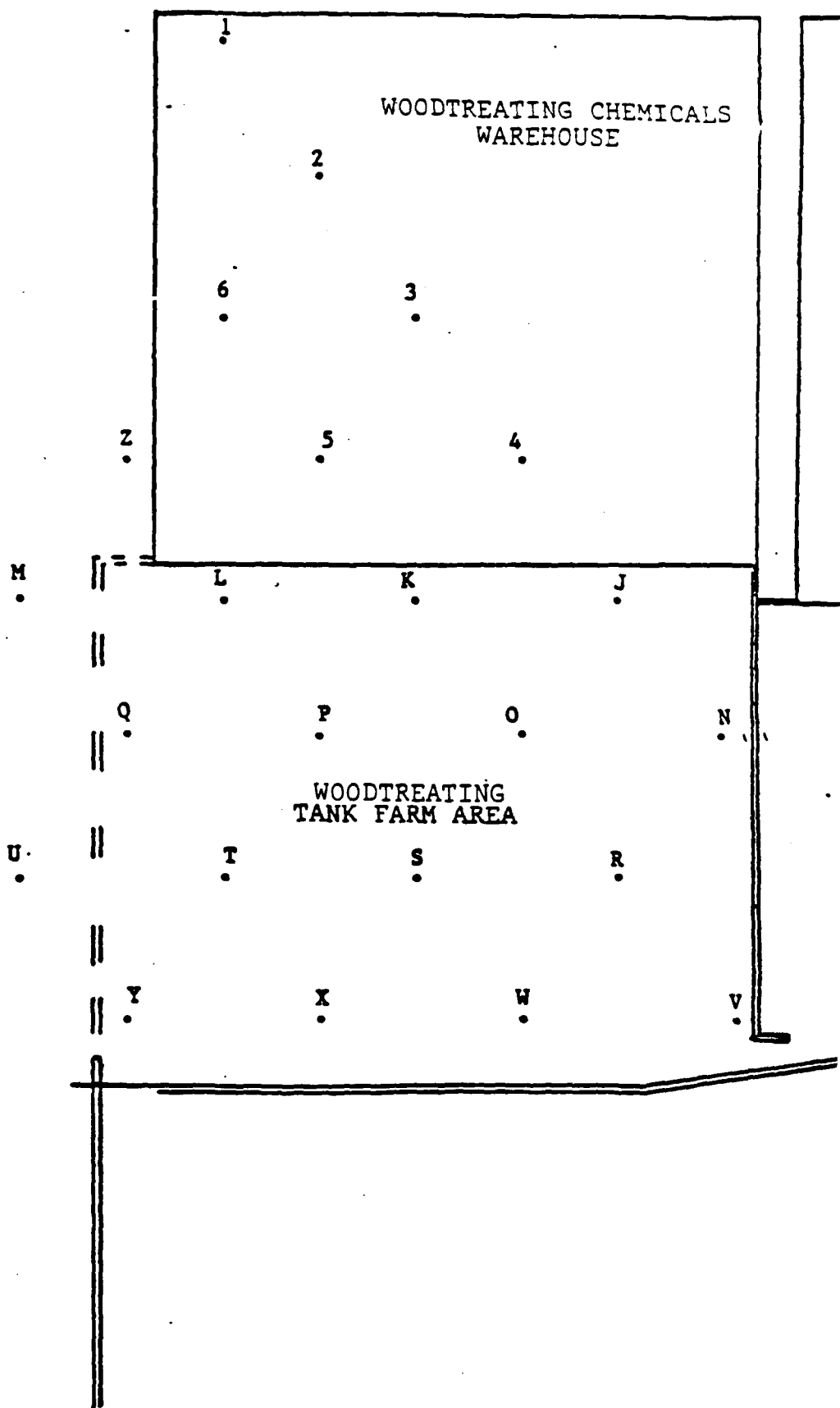
TIME OIL CO. - 12 FOOT PCP CONTOURS



FIGURE III-5

SAMPLE POINT LOCATIONS

NORT  
1"=2



# SAMPLE POINT COORDINATES

FIGURE III- 6

NORTH  
1"=20'

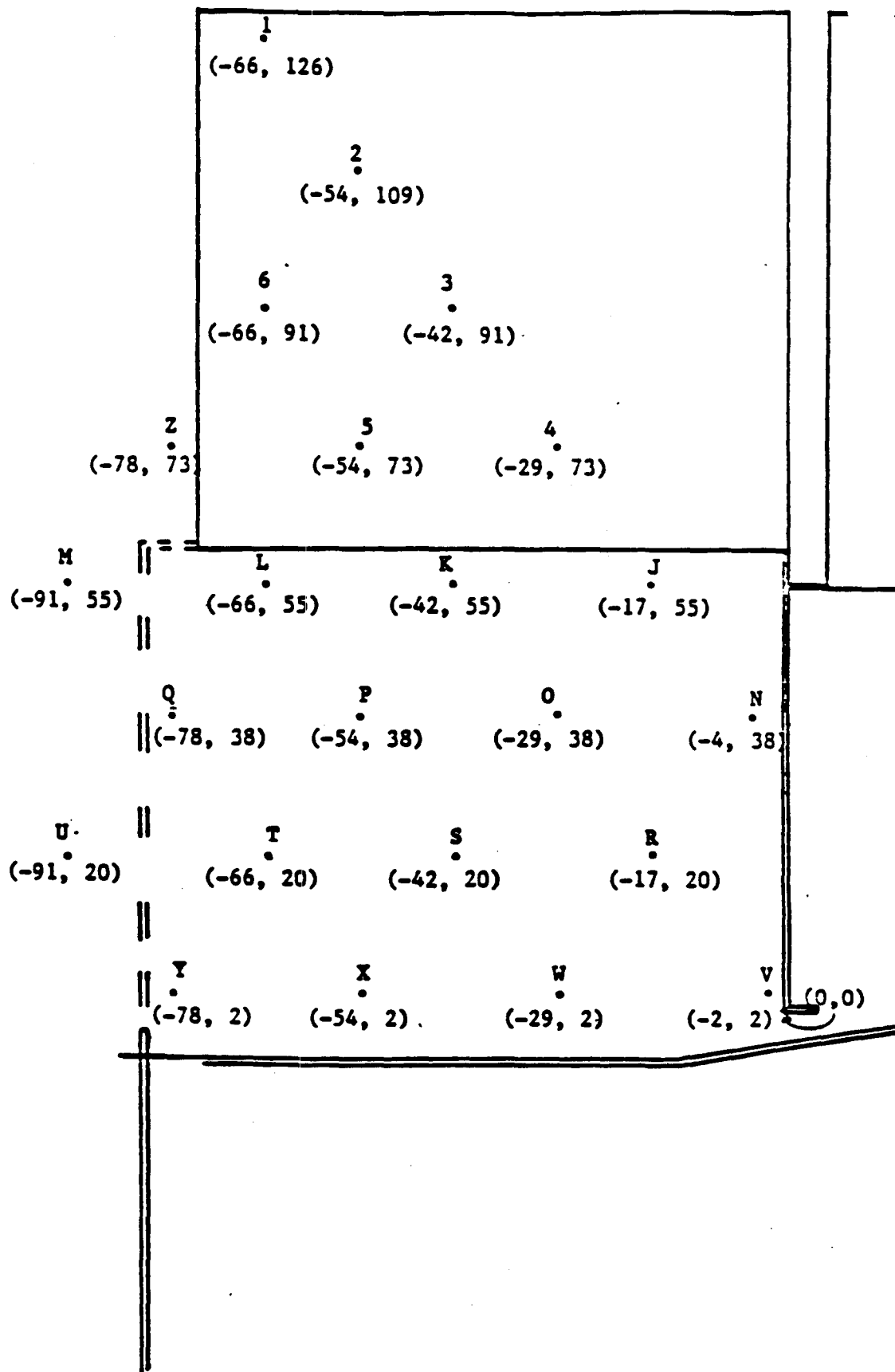
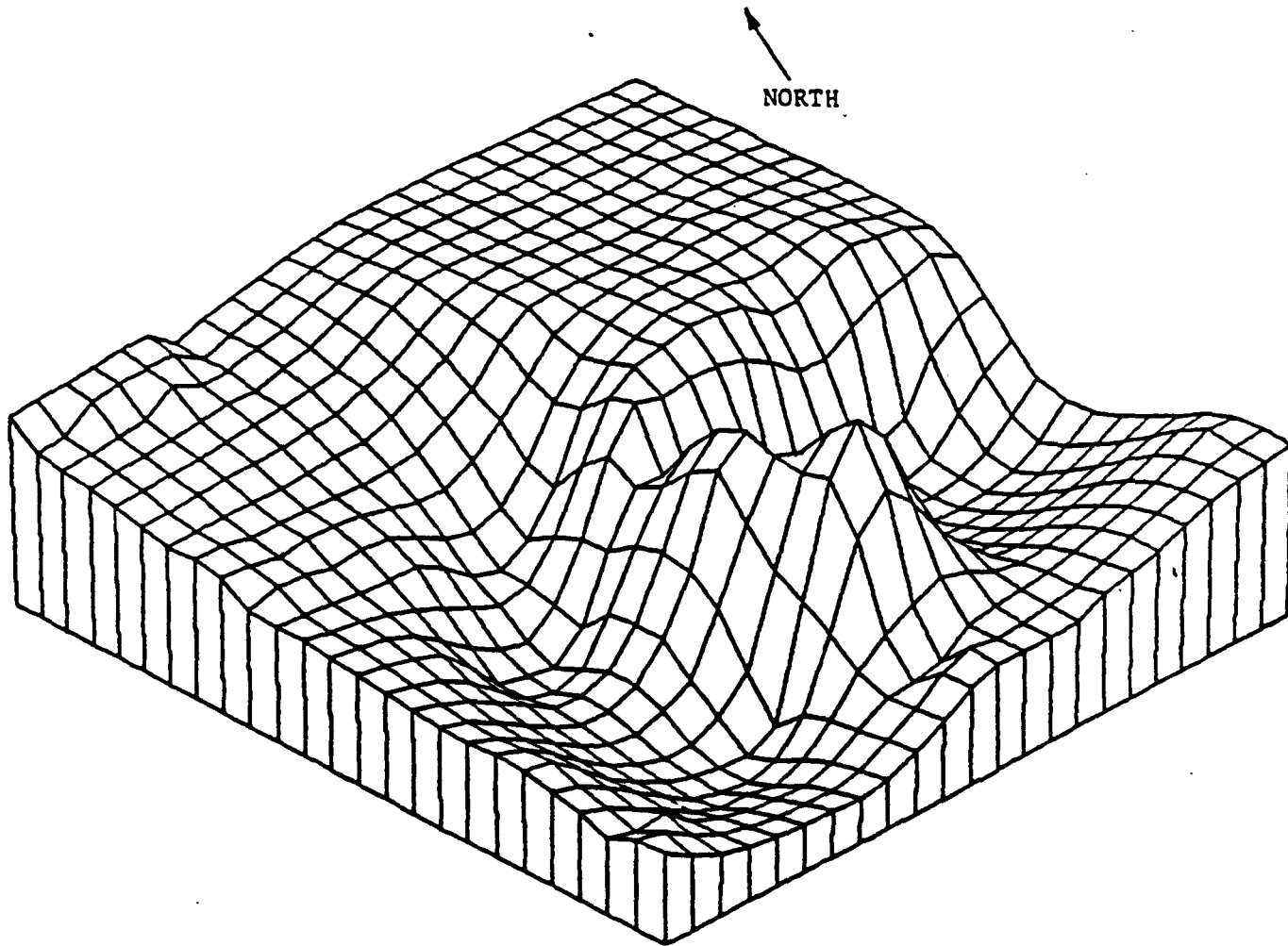


FIGURE III- 7

APPROXIMATE SURFACE TOPOGRAPHY

WOOD TREATING CHEMICALS AREA



TIME OIL CO. - TOPOGRAPHY

TABLE III-1

TIME OIL CO.

## COORDINATES - SURFACE PCP CONTOUR

CODE	X	Y	[PCP]
J	-17	55	2.3
K	-42	55	1200
L	-66	55	0.7
M	-91	55	1.8
N	-4	38	6.3
O	-29	38	176
P	-54	38	75.3
Q	-78	38	620
R	-17	20	891
S	-42	20	736
T	-66	20	1600
U	-91	20	0.7
V	-2	2	5
W	-29	2	354
X	-54	2	44.5
Y	-78	2	19
Z	-78	73	537
6	-66	91	0
5	-54	73	1.4
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	5.7

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-2

TIME OIL CO.

## COORDINATES - 2 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3
K	-42	55	8.8
M	-91	55	87
N	-4	38	3.1
O	-29	38	59
P	-54	38	16
R	-17	20	34
S	-42	20	252
T	-66	20	123
U	-91	20	44
V	-2	2	260
W	-29	2	15
X	-54	2	4.5
Z	-78	73	14
6	-66	91	0
5	-54	73	5.6
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-3

## TIME OIL CO.

## COORDINATES - 4 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
J	-17	55	3.6
K	-42	55	10.5
L	-66	55	7200
M	-91	55	22
N	-4	38	238
O	-29	38	23
P	-54	38	15
Q	-78	38	2205
R	-17	20	50
S	-42	20	184
T	-66	20	534
U	-91	20	55
V	-2	2	380
W	-29	2	8.1
X	-54	2	1.3
Y	-78	2	598
Z	-78	73	2
6	-66	91	0
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-4

TIME OIL CO.

COORDINATES - 7 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	3
L	-66	55	8400
M	-91	55	1
O	-29	38	13
P	-54	38	130
Q	-78	38	700
R	-17	20	500
S	-42	20	1130
T	-66	20	75
U	-91	20	5
V	-2	2	1
W	-29	2	1
X	-54	2	1.9
Y	-78	2	700
Z	-78	73	7
6	-66	91	0
5	-54	73	0
4	-29	73	0.96
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)

TABLE III-5

TIME OIL CO.

## COORDINATES - 12 FOOT PCP CONTOURS

CODE	X	Y	[PCP]
K	-42	55	2.3
L	-66	55	2030
M	-91	55	690
O	-29	38	38
P	-54	38	450
Q	-78	38	1150
R	-17	20	1
S	-42	20	217
T	-66	20	90
V	-2	2	3.4
W	-29	2	1.9
X	-54	2	1
Y	-78	2	720
Z	-78	73	1
6	-66	91	0.94
5	-54	73	0
4	-29	73	0
3	-42	91	0
2	-54	109	0
1	-66	126	0

NOTE: [PCP] = CONCENTRATION OF PCP (mg/Kg) or (ppm)



TABLE III-6

TIME OIL CO.

## GROUNDWATER ANALYTICAL RESULTS

(AUGUST 29, 1986)

WELL NUMBER	STATIC WATER LEVEL (FT BELOW TOP OF CASING)	pH	[PCP] (ppm)
MW-A	14.06	6.80	N.D.
MW-B	15.07	6.70	N.D.
MW-C	DRY	N.A.	N.A.
MW-D	14.48	6.53	.044
MW-E	15.22	6.54	N.D.
MW-F	15.44	6.57	N.D.
MW-G	DRY	N.A.	N.A.
MW-H	11.28	6.91	N.D.
MW-I	14.75	6.77	N.D.
RIVER	25.70	N.A.	N.A.

## NOTES:

[PCP] = CONCENTRATION OF PENTACHLOROPHENOL  
ppm = PARTS PER MILLION  
N.A. = NOT AVAILABLE  
N.D. = NOT DETECTED

**GROUNDWATER MONITORING**

**AT**

**TIME OIL COMPANY**

**NORTHWEST TERMINAL**

**PORTLAND, OREGON**

**November 5, 1987**

**Prepared For:**

**Time Oil Company  
2737 West Commodore Way  
Seattle, Washington**

**Prepared By:**

**SRH Associates, Inc.  
123 NE Third Ave. Suite 230  
Portland, Oregon 97232  
(503) 232-0824**

## INTRODUCTION

SRH Associates collected groundwater samples on August 20 and October 16, 1987, from Time Oil Co.'s Northwest Terminal Facility located in Portland, Oregon. The samples were analyzed for pentachlorophenol (PCP) in an effort to further existing data concerning past releases of this chemical from a wood treating chemicals formulating operation at this site.

The groundwater was sampled at nine existing monitoring wells surrounding the wood treating chemicals area and was analyzed for PCP and pH. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations located on the Northwest Terminal facility's unloading pier.

## GROUNDWATER SAMPLING

Nine vertical groundwater monitoring points at Time were measured for static water levels and tested for pH and PCP. The wells had been previously installed by Time employees or other contractors and consisted of 2 inch and 1 1/4 inch (I.D.) PVC screen or stainless steel drive points and PVC casing.

The water level elevations in the wells were measured to the nearest 0.01 foot from the top edge of the casing at a scribed mark located on the north side of the casing. A Fisher M-Scope previously calibrated against a steel tape was used to obtain the measurements. Standing bore volumes of well water were calculated based on these measurements and construction drawings provided by Time. A measurement of the Willamette River water elevation relative to a mark located by Time on its unloading pier was also taken.

Stainless steel weighted bailers were used to remove at least 4 standing bore volumes of water prior to collecting representative samples of groundwater. The bailers had been previously cleaned with sequential washings of laboratory detergent, tap water, hexane, tap water, trisodium phosphate and sodium carbonate in water, tap water, and distilled water (3X). The bailers were recleaned after each well was sampled and new, clean strings were attached. The purged water was collected into D.O.T. 17 E drums until proper disposal could be determined based on analytical results.

The samples were dispensed directly from the bailer into two 1 liter amber glass bottles fitted with screw cap closures and teflon liners for PCP analysis. Samples were adjusted to pH 2 with 1:1 Sulfuric Acid in distilled water and checked with pH paper prior to refrigeration and delivery to the lab. Samples for pH analyses were dispensed directly into 250 ml polyethylene wide mouthed bottles without preservatives. All samples were logged, labelled, sealed and transferred to the laboratory within 6 hours of collection.

pH analyses were performed within 2 hours of sample collection using a silver - silver chloride reference electrode standardized against two NBS traceable reference buffer solutions. PCP analyses were performed by first extracting the samples in the laboratory using method 3510, Separatory Funnel Liquid - Liquid Extraction, as described in EPA publication SW 846. The extract was then analyzed for PCP by method 8040, Phenols, as described in EPA publication SW 846. Field duplicates and laboratory and field blanks were analyzed. All quality control results indicated acceptable performance of sampling and analysis.

#### **SAMPLE ANALYSIS**

On August 20, a PCP concentration of 2300 ppb was detected in Well B. Well B was re-sampled on October 16 at which time a concentration of 1000 ppb was detected. No contamination has been observed in Wells A, D, F, H, and I. Wells C, E, and G were dry and could not be sampled. The locations of the wells are shown in Figure 1. The results of the groundwater investigation are summarized in Table 1.

#### **RECOMMENDATIONS**

- Define the rate and extent of contaminated groundwater migration by drilling 2 - 4 lateral downgradient wells near Well B.
- Pursue the remediation plan outlined in our October 1, 1986 correspondence to you. This plan included:
  - a) Selecting the "Surface Mounted Soil Washing" technique as the most logical remedial plan.
  - b) Performing bench scale and pilot level evaluations.
  - c) Determining necessary destruction steps of recovered extracts.
  - d) Ascertaining technical permitting and economic feasibility of technique for final disposal action.

- e) Comparing results with repeat step by step examination of next most logical remedial approaches which are: "Surface Mounted Thermal Extraction" and "In-Situ Thermal Extraction".
- Evaluate the vertical gradient of groundwater flux in an uncontaminated zone immediately adjacent to the soil pile by installing one well cluster with multiple completion depths.

TABLE 1 - GROUNDWATER SAMPLE RESULTS

Sample	ug/l PCP		pH	Depth to Water, Ft*		Static Water Level (ft. MSL) **	
	(1)	(2)				(1)	(2)
MW-A	<20	NA	6.61	13.78	14.74	83.36	82.40
MW-B	2300	1000	6.57	14.79	15.54	82.04	81.29
MW-C				(Dry)			
MW-D	<20	NA	6.60	14.29	15.24	83.64	82.69
MW-E				(Dry)			
MW-F	<20	NA	6.43	15.27	16.02	82.70	81.95
MW-G				(Dry)			
MW-H	<20	NA	6.64	13.78	12.10	83.71	82.65
MW-I	<20	NA	6.38	14.57	15.23	83.43	82.77
River				25.67	24.67		

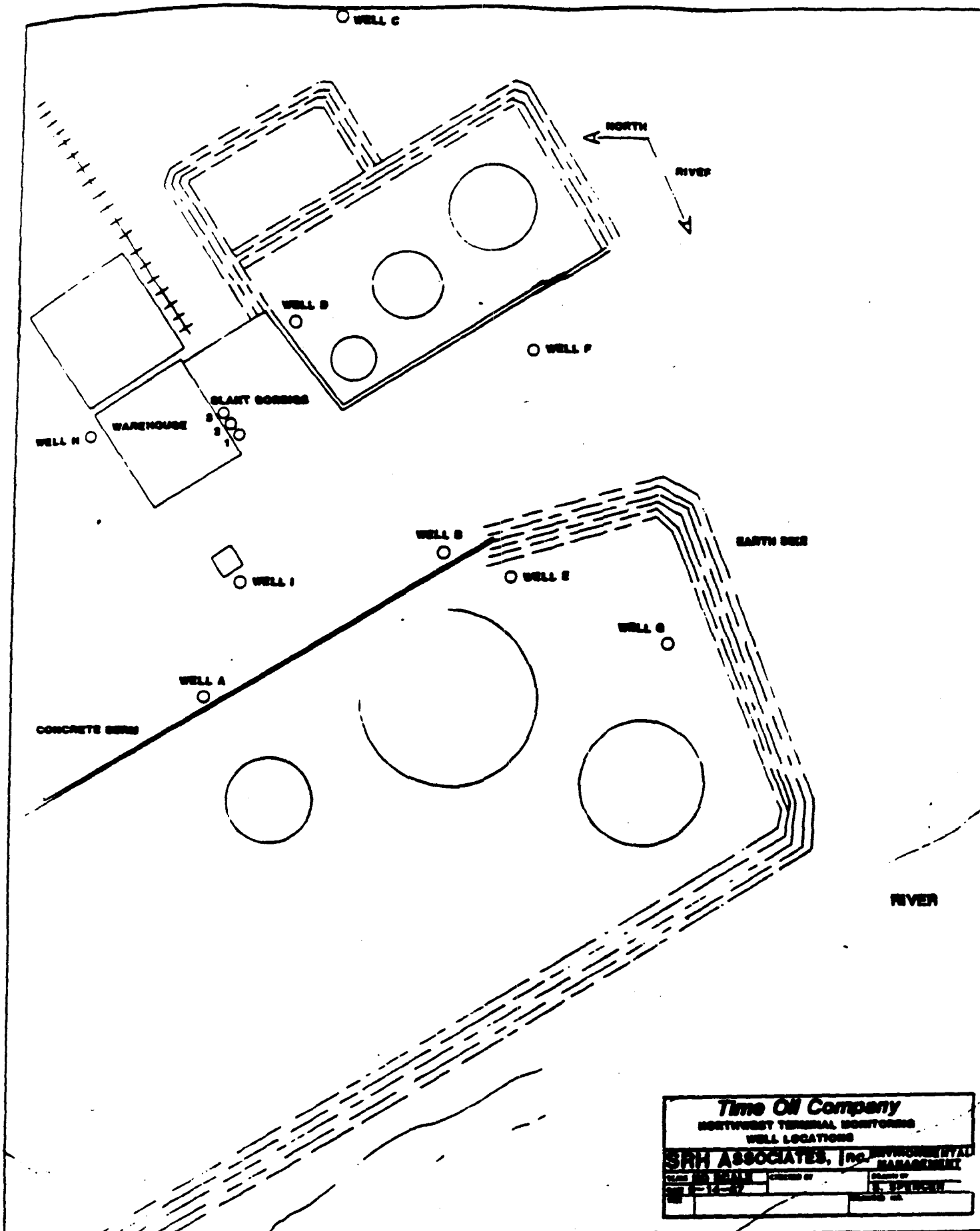
(1) As measured on 8/20/87

(2) As measured on 10/16/87

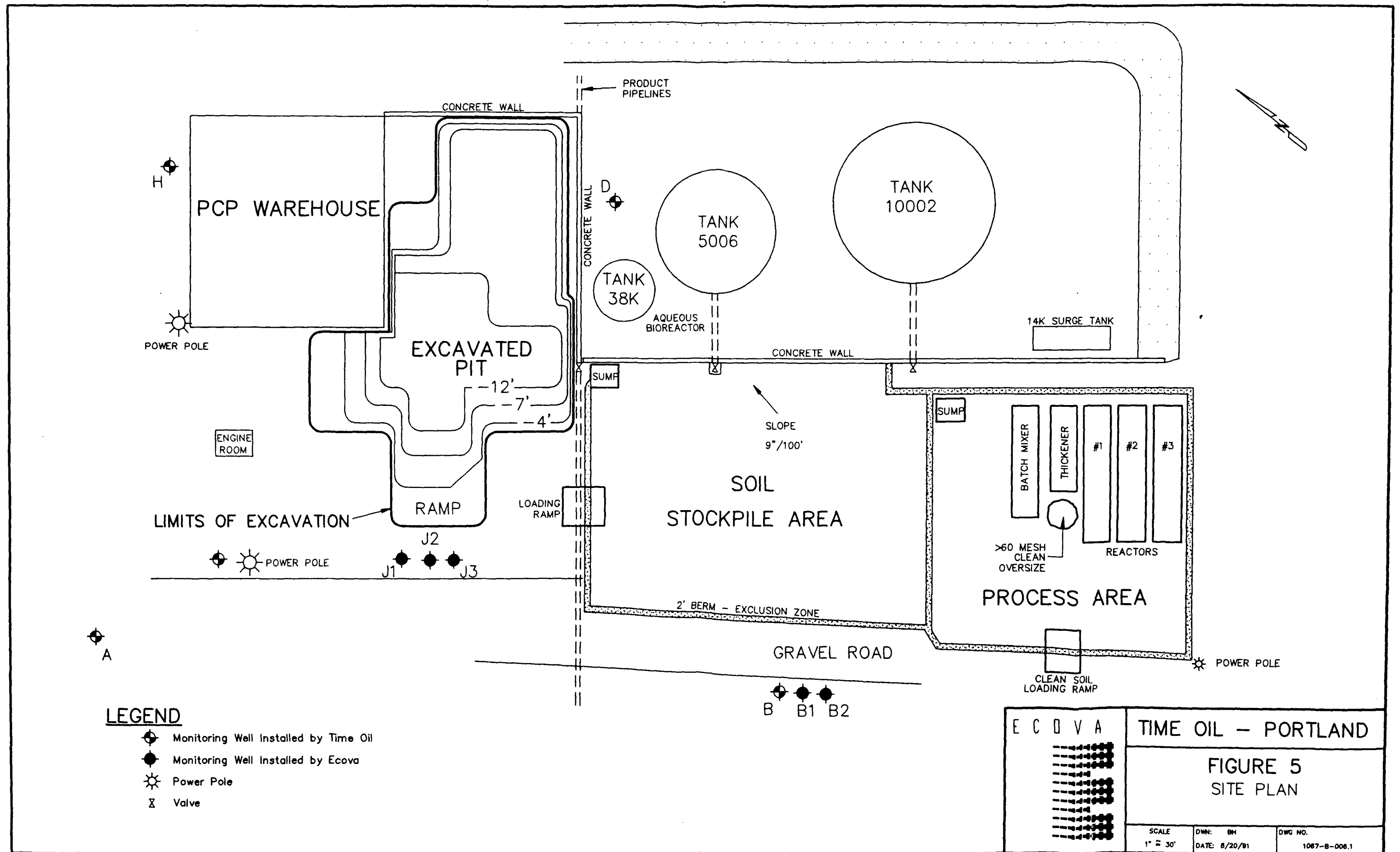
\* Distance from well stickup (or pier reference point) to water.

\*\* Relative to TBM established by TOC

NA = Not Analyzed



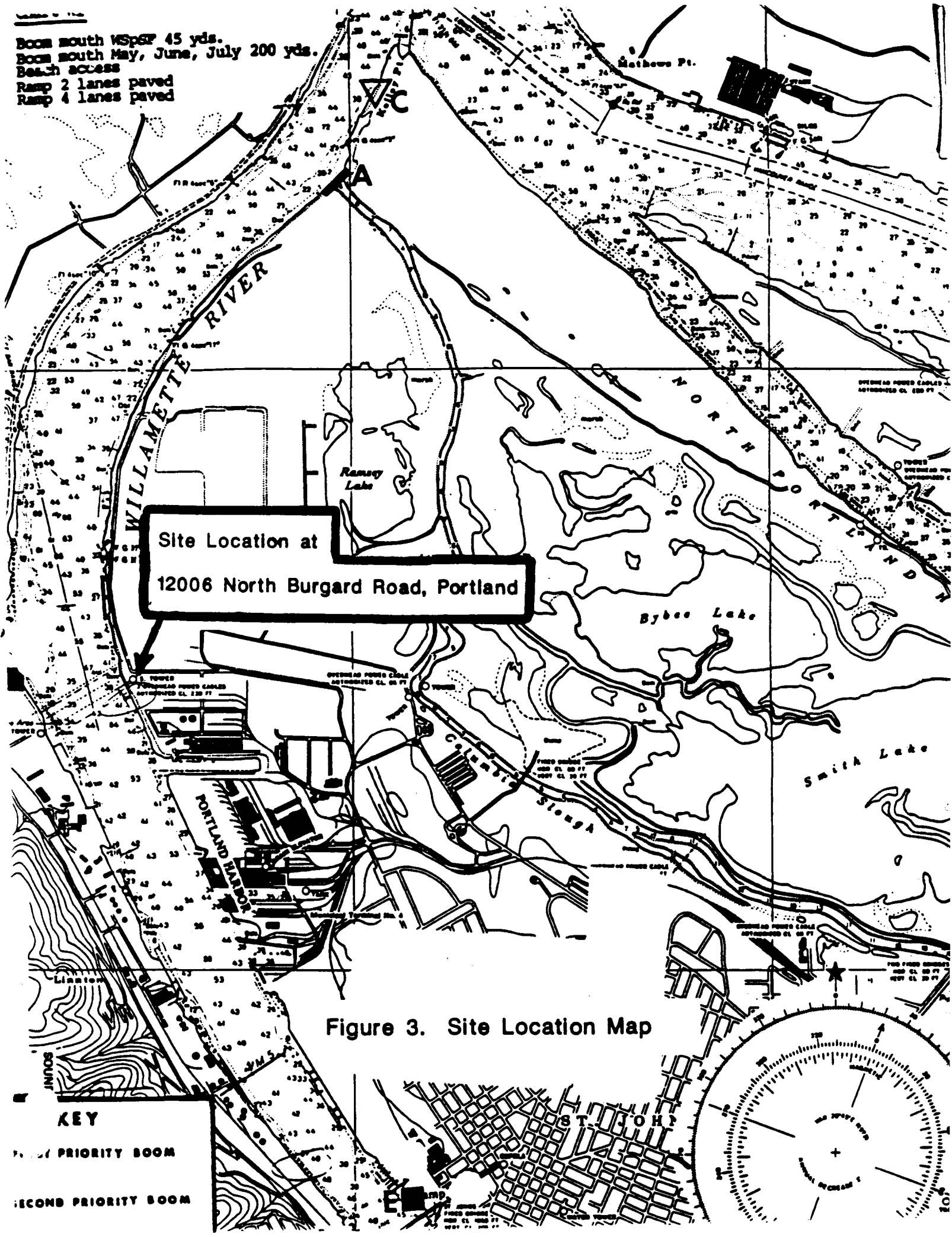
BZTO104(e)011428







Boom south WSPR 45 yds.  
 Boom south May, June, July 200 yds.  
 Beach access  
 Ramp 2 lanes paved  
 Ramp 4 lanes paved



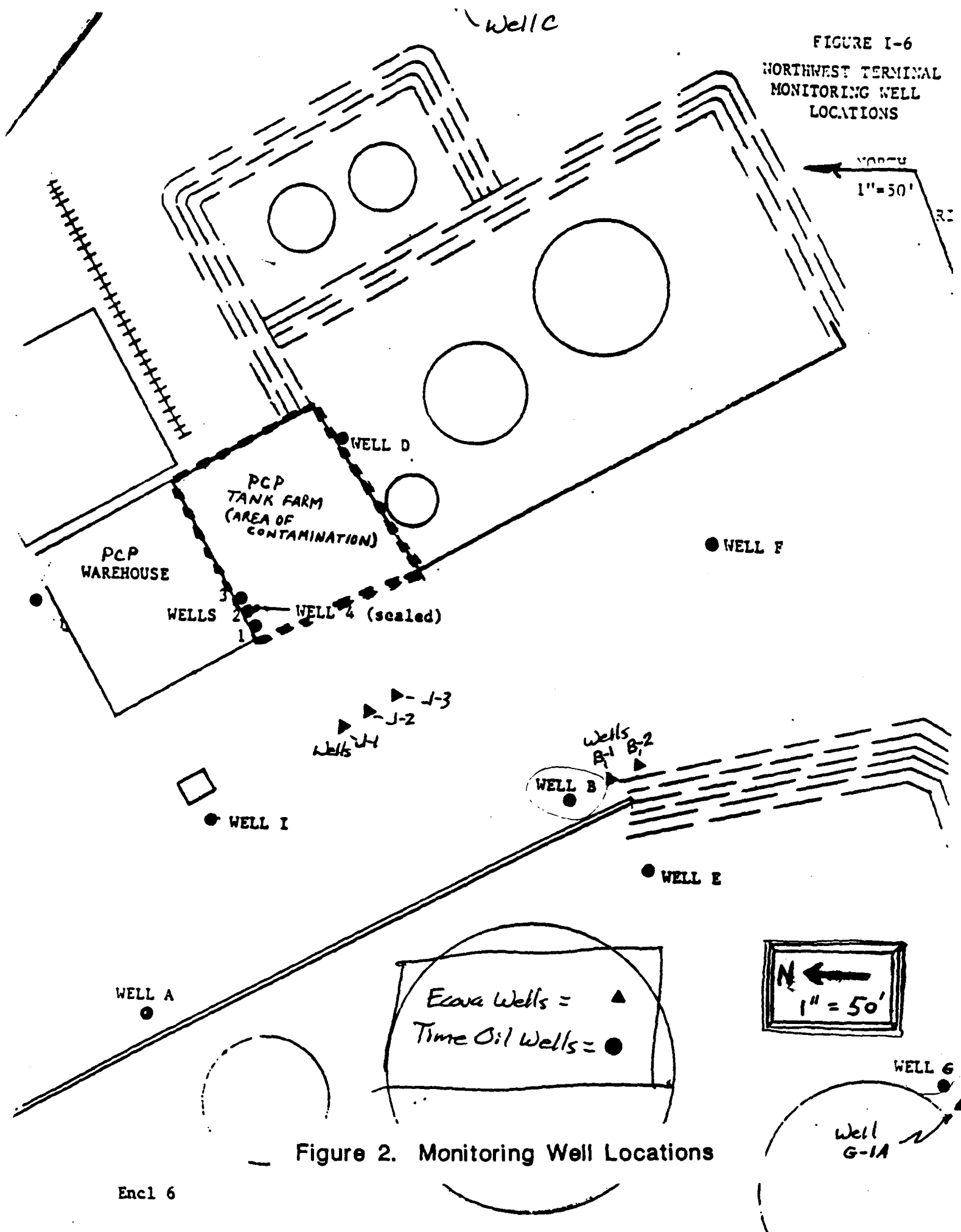
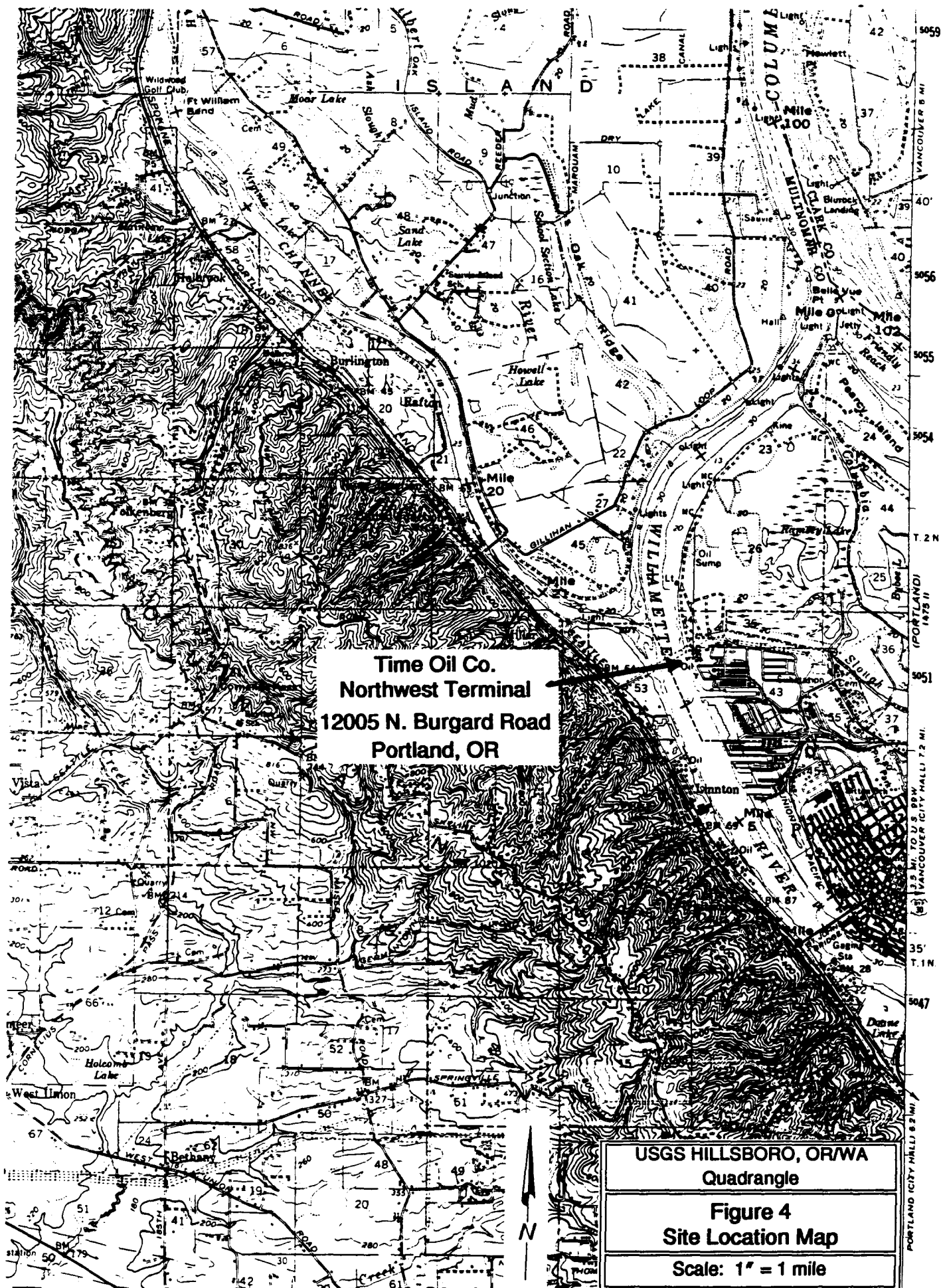


Figure 2. Monitoring Well Locations

Encl 6





# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 3, 1986

Log #A860825-F

SRH Associates, Inc.  
P.O. Box 14005  
Portland, Oregon 97214  
Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
J-O - Surface-N.E. Tank Farm	2.3
K-O - Surface-N. Tank Farm	2964
L-O - Surface-N.W. Tank Farm	0.7
M-O - Surface-N.W. Tank Farm	1.8
N-O - Surface-E. Tank Farm	6.3
O-O - Surface-N.E. Central Tank Farm	176
P-O - Surface-N. Central Tank Farm	75.3
Q-O - Surface-N.W. Central Tank Farm	620
R-O - Surface-E. Central Tank Farm	891
S-O - Surface-S.E. Central Tank Farm	736
T-O - Surface-N. Central Tank Farm	1600
U-O - Surface-W. Central Tank Farm	0.7
V-O - Surface-S.E. Tank Farm	5.0
W-O - Surface-S. Tank Farm	354
X-O - Surface-S. Tank Farm	44.6
Y-O - Surface-S.W. Tank Farm	19
Z-O - Surface-N.W. Roadway	537
1-S - Boring #1, Warehouse Loading Dock, Surface Below Concrete	1.2
1-O - Boring #1, Warehouse Loading Dock, 3.5 ft. Below Concrete	5.7
5-O - Boring #5, S.W. Inside Warehouse #5, 3'4" - 5'4" Below Concrete	1.4

Results in mg/kg

REPORT CONTINUES

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

BZTO104(e)011433



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 3, 1986

Log #A860825-F

SRH Associates, Inc.

Page Two

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS
-----	-----
5-2 - Boring #5, S.W. Inside Warehouse	
5'4" - 7'4" Below Concrete	5.6
5-4 - Boring #5, S.W. Inside Warehouse	
7'4" - 9'4" Below Concrete	< 1
5.7 - Boring #5, S.W. Inside Warehouse	
10'4" - 17'4" Below Concrete	< 1
5.12- Boring #5, S.W. Inside Warehouse	
15'4" - 17'4" Below Concrete	< 1
6-0 - Boring #6, W. Central Inside Warehouse	
3'5" - 5'5" Below Concrete	< 1
6-2 - Boring #6, W. Central Inside Warehouse	
5'5" - 7'5" Below Concrete	< 1
6-4 - Boring #6, W. Central Inside Warehouse	
7'5" - 9'5" Below Concrete	< 1
6-7 - Boring #6, W. Central Inside Warehouse	
10'5" - 12'5" Below Concrete	< 1
6-12- Boring #6, W. Central Inside Warehouse	
15'5" - 17'5" Below Concrete	0.94
D-2 - Waste Pile @ T-S, Duplicate of T-5	3420

Results in mg/kg

< denotes "less than"

REPORT CONTINUES

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

BZTO104(e)011434



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 3, 1986

Log #A860825-F

SRH Associates, Inc.  
Page Three

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

## SAMPLE ID

## RESULTS

T-S - Waste Pile, Feet Below Top of Pile	1280
Q-S - Waste Pile, Feet Below Top of Pile	298
D-1 - Boring #6, Duplicate of C-S	< 1
4-0 - Boring #4, S.E. Warehouse 3'5" - 5'5" Below Concrete	< 1
4-2 - Boring #4, S.E. Warehouse 5'5" - 7'5" Below Concrete	< 1
4-4 - Boring #4, S.E. Warehouse 7'5" - 9'5" Below Concrete	< 1
4-7 - Boring #4, S.E. Warehouse 10'5" - 12'5" Below Concrete	0.96
4-12 - Boring #4, S.E. Warehouse 15'5" - 17'5" Below Concrete	< 1
3-0 - Boring #3, E. Central Warehouse 3'5" - 5'5" Below Concrete	< 1
3-2 - Boring #3, E. Central Warehouse 5'5" - 7'5" Below Concrete	< 1
3-4 - Boring #3, E. Central Warehouse 7'5" - 9'5" Below Concrete	< 1
3-7 - Boring #3, E. Central Warehouse 10'5" - 12'5" Below Concrete	< 1
3-12 - Boring #3, E. Central Warehouse 15'5" - 17'5" Below Concrete	< 1

Results in mg/kg

REPORT CONTINUES

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

BZTO104(e)011435



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 3, 1986

Log #A860825-F

SRH Associates, Inc.

Page Four

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

Sample Location: Time Oil Co., Portland Terminal

SAMPLE ID	RESULTS	% Recovery
-----	-----	-----
6-4 - Boring #6, W. Central Inside Warehouse		
7'5" - 9'5" Below Concrete (Duplicate)	< 1	
4-4 - Boring #4, S.E. Warehouse		
7'5" - 9'5" Below Concrete (Duplicate)	< 1	
3-12- Boring #3, E. Central Warehouse		
15'5" - 17'5" Below Concrete (Duplicate)	< 1	
6-4 - Boring #6, W. Central Inside Warehouse		
7'5" - 9'5" Below Concrete (Spike)	399	101
4-4 - Boring #4, S.E. Warehouse		
7'5" - 9'5" Below Concrete (Spike)	373	96

Results in mg/kg

< denotes "less than"

Analysis by soxhlet extraction, capillary GC/FID, EPA Method 8040

Sincerely,

Susan M. Coffey,  
President

SMC/gs

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

BZTO104(e)011436





# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 3, 1986

Log #A860E26-C

SRH Associates, Inc.  
P.O. Box 14005  
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachloropnenol

Sample Location: Time Oil Co., Portland

Sample Date: 8/25/86

SAMPLE ID	RESULTS
-----	-----
2-0	< 1.0
2-2	< 1.0
2-4	< 1.0
2-7	< 1.0
2-12	< 1.0
1-2	< 1.0
1-4	< 1.0
1-7	< 1.0
1-12	< 1.0

Results in mg/kg

< denotes "less than"

Analysis by soxhlet extraction, capillary GC/FID, EPA Method 8040

Sincerely,

*Susan M. Coffey*  
Susan M. Coffey  
President

SMC/gs

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

BZTO104(e)011437



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 5, 1986

Log # A360829-L

P.O. None

SRA Associates Incorporated

P.O. Box 14005

Portland, Oregon 97214

Attention: John Ruddick

Subject: Pentachlorophenol and pH Analysis

Sample Type: Ground Water

Sample Collected by: John Ruddick

Sample Collection Date: August 29, 1986

SAMPLE NAME	FENTACHLOROPHENOL	pH
-----	-----	--
MW-D	0.04 mg/L	6.53 SU
MW-E	< 0.01 mg/L	6.54 SU
MW-F	< 0.01 mg/L	6.57 SU
MW-H	< 0.01 mg/L	6.91 SU
MW-I	< 0.01 mg/L	6.77 SU

Pentachlorophenol analysis by extraction and capillary GC/FID.

The symbol "<" means less than and denotes none detected at or above the level indicated.

Sincerely,

*Susan M. Coffey*

Susan M. Coffey,  
President

SMD:hh

This report for the sole and exclusive use of the above named client. Samples are held for a maximum of 15 days from the date of this report.



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 9, 1986

Log #A860953-J

SRH Associates, Inc.  
P.O. Box 14005  
Portland, Oregon 97214

Attention: John Ruddick

Analyses Requested: Pentachlorophenol (PCP) and pH

SAMPLE ID -----	PCP* -----	pH -----
MWA, 9/3/86, 1030	< 0.01 mg/L	6.8 S.U.
MWA, 9/3/86, 1110	< 0.01 mg/L	6.7 S.U.

< denotes "less than"

\* Analysis by extraction, capillary GC/FID, Method 604.

Approved by,

*Susan M. Brillante*

Susan M. Brillante,  
Mgr., Organic Laboratories

Sincerely,

*Susan M. Coffey*

Susan M. Coffey,  
President

SMC/gs

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this report.



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

September 18, 1986

Log #ASE0916-F

SRH Associates, Inc.  
P.O. Box 14005  
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

SAMPLE 12  
-----

RESULTS  
-----

#20 55

0.3 mg/kg

Analysis by extraction, capillary GC/FID and comparison with solutions of standards.

Approved by:

*Susan M. Brillante*

Susan M. Brillante,  
Mgr., Organic Laboratories

Sincerely,

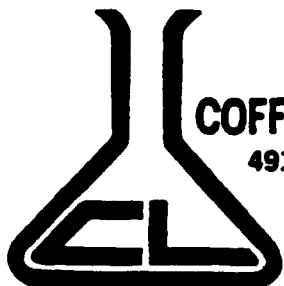
*Susan M. Coffey*

Susan M. Coffey,  
President

SMC/ps

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

BZTO104(e)011440



**COFFEY LABORATORIES, INC.**

4914 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

October 1, 1986  
Log #A860926-A

SRH Associates, Inc.  
123 N.E. Third/Suite 230  
P.O. Box 14005  
Portland, Oregon 97214

Attention: John Ruddick

Analysis Requested: Pentachlorophenol

SAMPLE ID  
-----

RESULTS  
-----

K-0, 9/26  
0915, Soil

1200 mg/kg

Analysis by EPA Method 8040, capillary GC/FID.

Approved by,

*Susan M. Brillante*  
Susan M. Brillante,  
Mgr., Organic Laboratories

Sincerely,

*Susan M. Coffey*  
Susan M. Coffey,  
President

SMC/ys

This report is for the sole and exclusive use of the above client.  
Samples are retained a maximum of 15 days from the date of this letter.

[illegible]

PROJ. NO.	SITE/LOCATION		DATE		TIME	NO. OF CONTAINERS	AMOUNT / PRESERVATIVE	PLANT / SPECIES / HAZ.	SEAL NO.	SEAL INTACT? (Y/N)	REMARKS (with latitude)
1003	Time Oil Co PDX										
SAMPLES (Signature) <i>[Signature]</i>											
STA. NO.	DATE	TIME	NO. OF CONTAINERS	AMOUNT / PRESERVATIVE	PLANT / SPECIES / HAZ.	SEAL NO.	SEAL INTACT? (Y/N)	REMARKS (with latitude)			
MWD	8/29	1600	3		SW TANK FARM						
MW-E		1430			SW TANK FARM						
MW-F		1615			ROADWAY (S)						
MW-H		1500			REAR-LOADING DOCK						
MW-I		1630			ROADWAY (N)						
RECEIVED BY: (Signature/Firm) <i>[Signature]</i> DATE: 8/29/01 1800 RETRIEVED BY: (Signature/Firm) <i>[Signature]</i> DATE: 8/29/01 1800 RECEIVED BY: (Signature/Firm) <i>[Signature]</i> DATE: 8/29/01 1800 RETRIEVED BY: (Signature/Firm) <i>[Signature]</i> DATE: 8/29/01 1800											

[illegible]



CHAIN OF CUSTODY RECORD (cont.)

PROJ. NO.		SITE / LOCATION		NO. OF CONTAINERS		AMOUNT PRESERVED		REMARKS (with initials)	
1003		Timor Co - Port Moresby		1		100%			
SAMPLERS: (Signature)		SRH ASSOC.							
SERIAL NO.	DATE	TIME	TIME	TIME	TIME	SAMPLE IDENTIFICATION	DATE / TIME	RECEIVED BY: (Signature/Firm)	RECEIVED BY: (Signature/Firm)
J-D	8/23	1045	0800	3012	3012	SURFACE - NE-TIME FIRM			
K-D		1030				" - N "			
L-D		1045				" - NW "			
M-D		1055				" - NW "			
N-D		1105				" - E "			
O-D		1110				" - CENTRAL "			
P-D		1115				" - CENTRAL "			
Q-D		1120				" - CENTRAL "			
R-D		1125				" - CENTRAL "			
S-D		1130				" - CENTRAL "			
T-D		1135				" - CENTRAL "			
U-D		1140				" - CENTRAL "			
V-D		1145				" - SE "			
W-D		1150				" - S "			
X-D		1200				" - S "			
Relinquished by: (Signature/Firm)		8/24/01		1045		SRH		8/25/01	
Relinquished by: (Signature/Firm)								8/25/01	
Relinquished by: (Signature/Firm)								8/25/01	

# CHAIN OF CUSTODY RECORD

PROJ. NO. 1003		SITE / LOCATION Tins on Co - Portland Technical		NO. OF CON- TAINERS		AMOUNT / PRESERVATIVE P. 17M CHLOROFORM		SEAL NO.		REMARKS (with latitude)	
STA. NO.	DATE	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME
6-2	8/24	11:40	11:40	11:40	11:40	11:40	11:40	11:40	11:40	11:40	11:40
6-4	8/24	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
6-7	8/24	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30	12:30
6-12	8/24	14:20	14:20	14:20	14:20	14:20	14:20	14:20	14:20	14:20	14:20
D-2	8/24	15:30	15:30	15:30	15:30	15:30	15:30	15:30	15:30	15:30	15:30
T-5	8/24	15:30	15:30	15:30	15:30	15:30	15:30	15:30	15:30	15:30	15:30
Q-5	8/24	16:15	16:15	16:15	16:15	16:15	16:15	16:15	16:15	16:15	16:15
2-1	8/24	10:50	10:50	10:50	10:50	10:50	10:50	10:50	10:50	10:50	10:50
4-5	8/24	16:10	16:10	16:10	16:10	16:10	16:10	16:10	16:10	16:10	16:10
4-0	8/24	16:50	16:50	16:50	16:50	16:50	16:50	16:50	16:50	16:50	16:50
4-2	8/24	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15	17:15
4-4	8/24	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45	17:45
4-7	8/24	18:20	18:20	18:20	18:20	18:20	18:20	18:20	18:20	18:20	18:20
<p>RECEIVED BY: (Signature/Name) 8/25/02 1045</p> <p>RECEIVED BY: (Signature/Name) 8/25/02 1051</p> <p>RECEIVED BY: (Signature/Name)</p>											

# CHAIN OF CUSTODY RECORD

PROJ. NO.		SITE / LOCATION		NO. OF CONTAINERS		AMOUNT / PRESERVATIVE / TIME		SEAL NO.		REMARKS (with initials)	
STA. NO.	DATE	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME	TIME
1003	5/24	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
SAMPLED BY: <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>											
SAMPLE IDENTIFICATION: <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i> <i>SOIL</i>											
4-12	5/24	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
3-5	5/24	1915	1915	1915	1915	1915	1915	1915	1915	1915	1915
3-6	5/24	1955	1955	1955	1955	1955	1955	1955	1955	1955	1955
3-2	5/24	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
3-4	5/24	2015	2015	2015	2015	2015	2015	2015	2015	2015	2015
3-7	5/24	2027	2027	2027	2027	2027	2027	2027	2027	2027	2027
3-12	5/24	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100
RECEIVED BY: <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>											
RECEIVED BY: <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>											
RECEIVED BY: <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>											

# CHAIN OF CUSTODY RECORD

PROJ. NO.	SITE/LOCATION		DATE		TIME	NO. OF CONTAINERS	AMOUNT / RESERVATIVE	SEAL NO.	SEAL INTACT? (Y/N)	REMARKS (with initials)
1003	TINEL OIL Co - Portland Tinn.									
<p>SAMPLERS: (Signatures)</p> <p><i>John H. Dill</i> - SRH Assoc.</p>										
STA. NO.	DATE	TIME	NO. OF CONTAINERS	AMOUNT / RESERVATIVE	SEAL NO.	SEAL INTACT? (Y/N)	REMARKS (with initials)			
Y-0	8/23	1205	1	100%						
Z-0	"	1210	1	100%						
1-3	8/23	1255	1	100%						
1-0	"	1335	1	100%						
5-5	8/23	1405	1	100%						
5-0	"	1410	1	100%						
5-2	"	1415	1	100%						
5-4	"	1405	1	100%						
5-7	"	1425	1	100%						
5-12	"	1400	1	100%						
6-5	8/24	1050	1	100%						
6-0	8/24	1130	1	100%						
<p>Relinquished by: (Signature/Name) <i>John H. Dill</i> 8/25/86 1045</p> <p>Received by: (Signature/Name)</p>										
<p>Relinquished by: (Signature/Name)</p> <p>Received by: (Signature/Name)</p>										
<p>Relinquished by: (Signature/Name)</p> <p>Received by: (Signature/Name)</p>										



**4914 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794**

**CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):**

PENTA BY EPA 8040 (SW846)  
(DON'T FILTER - DECANT WATER OFF ANY SEDIMENT)

MWA	9/3/82	1030	WATER	1:1000	250 ml	PENTACHLOROPHENOL
MWA	"	1030	"	NONE	PLASTIC	P H
MWB	"	1110	"	1:1000	250 ml	PENTACHLOROPHENOL
MWB	"	1110	"	NONE	PLASTIC	P H

Relinquished by: St. L. D. Q. L. /s/ St. L. D. Q. L. Date: 7/3/86 Time: 1450 Received for Coffee Labs by: A. Schuch

FILE INTEGRITY COMMENTS:

AD LOG # 760703-J : LOGGED IN BY: : DATE: : TIME:

```
:\wp\clom\form\log\login.log
```

BZTO104(e)011449

CLIENT  
ANALYSIS  
REQUEST



# COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

COMPANY NAME SRH ASSOCIATE TELEPHONE# 232-0824  
ADDRESS 123 NE 3RD STE 230 PURCHASE ORDER # VERBAC  
ADDRESS 14005 LAB PRICE QUOTE #       
CITY/STATE ZIP PORTLAND OR 97214 BILLING ADDRESS:  
ATTENTION JOHN RUDDICK  
SAMPLE COLLECTION DATE 8/29/86 DUE DATE ASAP RUSH       
SAMPLE COLLECTED BY J. RUDDICK DELIVERED BY JHR  
CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):

Penta by EPA 8040 (SW-846)

FILE#	DATE	TIME	MEDIA	PRESIDENT	ANALYSIS REQUESTED
MW-D	8/29	1600	2502	111	2E
MW-E	1430				
MW-F	1615				
MW-H	1500				
MW-I	1650				
MW-D	1600				
MW-E	1430				
MW-F	1615				
MW-H	1500				
MW-I	1650				

Relinquished by: [Signature] Date: 8/29/86 Time: 1800 Received for Coffey Lab by: Susan M Coffey

SAMPLE INTEGRITY COMMENTS:

LAB LOG # A860829 N 1-10 LAB LOGGED IN BY: S Coffey DATE: 8-29-86 TIME: 175



# COFFEY LABORATORIES, INC.

4814 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

COMPANY SRH ASSOCIATES TELEPHONE# 503 232 0824  
ADDRESS 125 NE 3<sup>RD</sup> ST 230 PURCHASE ORDER # VL284L  
ADDRESS PO Box 14005 LAB PRICE QUOTE # 60<sup>00</sup>/sample  
CITY/ST/ZIP Portland OR 97214 BILLING ADDRESS:  
ATTENTION John Ruidick  
SAMPLE ACTION DATE 8/23/86 DUE DATE 9/2/86 RUSH \_\_\_\_\_  
SAMPLE TESTED BY J Ruidick DELIVERED BY JHR

CLIENT COMMENTS (SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):  
PENTACHLORO PHENOL BY EPA 8040 (SW 846)

Date		Time	Method	Analysis requested
A-0	5/23	1125	Soil	None 502 Pentachlorophenol (EPA 8040)
S-0		1130		
T-0		1135		
U-0		1140		
V-0		1145		
W-0		1150		
X-0		1200		

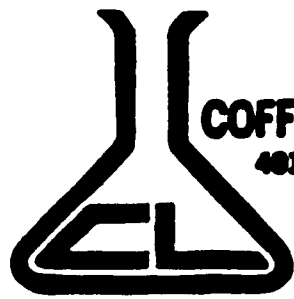
DATE 8/25/86 TIME 1045 RECEIVED BY John Ruidick  
LABORATORY COMMENTS:

RE LOG \_\_\_\_\_ LAB LOG IN BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_





ANAL  
REQUIRE



**COFFEY LABORATORIES, INC.**  
4814 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

COMPANY SRH ASSOCIATES TELEPHONE# 503 232 0824  
ADDRESS 125 W E 3<sup>RD</sup> ST. 230 PURCHASE ORDER # VLR84L  
ADDRESS PO Box 14005 LAB PRICE QUOTE # 60<sup>00</sup>/sample  
CITY/STATE PORTLAND OR 97214 BILLING ADDRESS:  
ATTENTION JOHN RUNDICK  
SAMPLE COLLECTION DATE 8/25/86 DUE DATE 9/2/86 RUSH \_\_\_\_\_  
SAMPLE COLLECTED BY J RUNDICK DELIVERED BY JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):  
PENTACHLORO PHENOL BY EPA 8040 (SW 846)

*****		*****				*****	
Date		Time	Media	Resident	Analysis	requested	
6-4	8/24	1200	Soil	Nms	8040	Penta	(EPA 8040)
6-7		1230					
6-12		1420					
D-2		1520					
T-5		1530					
Q-5		1615					
D-1		1050					
4-5		1610					(HOLD)
4-0		1650					
4-2		1715					

BY: John Rundick / SRH Date Time Received for Coffey Labs by: 8/25/86 1045 Steven H. [Signature]

CLIENT COMMENTS:

LAB LOG: LOGGED IN BY: DATE: TIME:



# COFFEY LABORATORIES, INC.

4814 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794

COMPANY SRH ASSOCIATES TELEPHONE# 503 232 0824

ADDRESS 125 NE 3<sup>RD</sup> ST 230 PURCHASE ORDER # VERBAL

ADDRESS PO Box 14005 LAB PRICE QUOTE # 60<sup>00</sup>/sample

CITY/STATE PORTLAND OR 97214 BILLING ADDRESS:

ATTENTION JOHN RUDDICK

SAMPLE COLLECTION DATE 8/24/86 DUE DATE 9/2/86 RUSH

SAMPLE COLLECTED BY J RUDDICK DELIVERED BY JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):  
PENTACHLORO PHENOL BY EPA 8040 (SW 846)

\*\*\*\*\*  
DATE TIME METHOD PRESENTATION ANALYSIS REQUESTED

6-S	8/24	1050	Soil Nme	glass	Penta (EPA 8040)	(HOLD)
6-O		1130				
4-12		1900				
3-S		1915				(HOLD)
3-O		1955				
3-2		2010				
3-4		2015				
3-7		2025				
3-12		2100				
6-2		1140				

RECEIVED BY: John H. Ruddick / SRH DATE TIME RECEIVED BY COFFEY LABS: 8/25/86 1045 [Signature]

NOTE: LABILITY COMMENTS.

\*\*\*\*\*  
LAB LOG: LABS IN BY: DATE: TIME:



# COFFEY LABORATORIES, INC.

4814 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

COMPANY NAME SRH ASSOCIATES TELEPHONE# 503 232 0824  
ADDRESS 123 NE 3<sup>RD</sup> ST 230 PURCHASE ORDER # VERBAL  
ADDRESS PO Box 14005 LAB PRICE QUOTE # 60<sup>00</sup>/sample  
CITY/STATE PORTLAND OR 97214 BILLING ADDRESS:  
ATTENTION JOHN RUDDICK  
SAMPLE COLLECTION DATE 8/25/86 DUE DATE 9/2/86 RUSH \_\_\_\_\_  
SAMPLE COLLECTED BY J RUDDICK DELIVERED BY JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):  
PENTACHLORO PHENOL BY EPA 8040 (SW 846)

*****									
DATE Time Media Description Analysis requested									M
2-5	8/25	1130	SOIL	NONE	GLASS 802	PENTA	BY	EPA 8040	(HOLD)
2-0	1145								Run
2-2	1450								Run
2-4	1520								Run
2-7	1545								Run
2-12	1720								Run
1-3	1915								Run
1-4	1950								Run
1-7	2030								Run
1-12	2130								Run

RECEIVED BY: [Signature] Date: 8/26 Time: 1225 Received at Coffey Lab b  
SAMPLE ID: \_\_\_\_\_  
ANALYST: \_\_\_\_\_  
LABILITY COMMENTS: \_\_\_\_\_

\*\*\*\*\*  
LAB LOG = \_\_\_\_\_ LOGGED IN BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

# COFFEY LABORATORIES, INC.

4814 N.E. 122nd Ave.

Portland, OR 97230

Phone: (503) 254-1794



COMPANY SRH ASSOCIATES TELEPHONE# 503 232 0824  
 ADDRESS 125 NE 3<sup>RD</sup> STE 230 PURCHASE ORDER # VLR241  
 ADDRESS PO Box 140015 LAB PRICE QUOTE # 60<sup>00</sup>/sample  
 CITY/STATE PORTLAND OR 97214 BILLING ADDRESS:  
 ATTENTION JOHN RUDDICK  
 SAMPLE COLLECTION DATE 8/23/86 DUE DATE 9/2/86 RUSH  
 SAMPLE TESTED BY J RUDDICK DELIVERED BY JHR

CLIENT COMMENTS-(SPECIAL INSTRUCTIONS, SPECIFIC METHOD ETC):  
PENTACHLORO PHENOL BY EPA 8040 (SW 846)

DATE		TIME	RECEIVED FOR ANALYSIS REQUESTED
Y-C	8/23	1205	SOIL <sup>502</sup> <u>NEW GLEN PENTACHLORO PHENOL (EPA 8040)</u>
Z-C	1210		
1-S	1255		(HOLD)
1-O	1635		
5-S	1655		(HOLD)
5-O	1710		
5-2	1745		
5-4	1805		
5-7	1825		
5-12	1900		

DATE 8/25 TIME 1045 RECEIVED FOR COFFEY LABS BY John H. Rudick  
 CLIENT COMMENTS:

LAB LOG ISSUED IN BY: DATE: TIME:

TIME OIL CO.  
ECOVA PRELIM. ASSESSMENT  
(DEC. 1991) VOL. I

PRC

**PRELIMINARY ASSESSMENT / DATA EVALUATION  
AND PROPOSED REMEDIATION PLAN  
FOR PENTACHLOROPHENOL CONTAMINATED SOIL AT:**

**TIME OIL CO.**

**NORTHWEST TERMINAL  
12005 NORTH BURGARD ROAD  
PORTLAND, OREGON**

**ECOVA Corporation  
18640 NE 67th Court  
Redmond, WA 98052**

**Project No. 1067**

**ECOVA**



## TABLE OF CONTENTS

EXECUTIVE SUMMARY .....	v
-------------------------	---

### PAI - PRELIMINARY ASSESSMENT PART I

I.	GENERAL SITE DATA	
A.	Site Name .....	2
B.	Street Address .....	2
C.	Site Contact .....	2
D.	Current Legal Owner .....	2
E.	Current Operator .....	2
II.	SITE DESCRIPTION	
A.	Legal Description .....	3
B.	Coordinates .....	3
C.	Directions to the site .....	3
D.	Total area of site .....	3
E.	Surrounding Land Uses .....	3
III.	OWNERSHIP INFORMATION	
A.	Past Legal Owners .....	4
B.	Type of Ownership .....	4
C.	Past Lessees/Operators .....	4
IV.	SITE HISTORY AND POTENTIAL PROBLEMS	
A.	Site Operations .....	5
B.	Emergency/Remedial Actions .....	6
C.	Description of Prior Spills .....	11
D.	Sampling and Analysis Data .....	12
E.	Bibliography of Files/Reports .....	12
V.	HAZARDOUS SUBSTANCE/WASTE CHARACTERIZATION	
A.	Hazardous Materials and Types .....	14
B.	Waste Generation .....	14
C.	Waste Treatment Systems .....	14
D.	Permits .....	15
E.	Permit Violations .....	15
F.	Hazardous Waste Disposal .....	15



VI.	WASTE CONTAINMENT .....	16
VII.	USGS TOPOGRAPHIC MAP .....	17
VIII.	SITE MAP .....	18
IX.	SUMMARY AND RECOMMENDATIONS .....	19

## PAII - PRELIMINARY ASSESSMENT PART II

I.	SOIL PATHWAY	
A.	Observed Releases .....	21
B.	Accessibility .....	24
C.	Containment .....	24
D.	Hazardous Substances Characteristics .....	24
E.	Soil/Geology .....	25
F.	Targets .....	25
II.	GROUNDWATER PATHWAY	
A.	Observed Releases .....	26
B.	Route Characteristics .....	28
C.	Containment .....	29
D.	Hazardous Substances Characteristics .....	29
E.	Targets .....	29
III.	SURFACE WATER PATHWAY .....	31
IV.	AIR PATHWAY .....	32
V.	SUMMARY AND RECOMMENDATIONS .....	33





### PAIII - WORK PLAN

I.	BACKGROUND AND OBJECTIVES	
A.	Site Description/History/Operating Practices	35
B.	Summary of Sampling Information	37
C.	Objectives of Proposed Sampling and Analysis	38
II.	PROJECT ORGANIZATION	39
III.	SOILS	
A.	Proposed Soil Borings	41
B.	Soil Types	41
IV.	GROUNDWATER	
A.	Well Installation	42
B.	Proposed Analytical Parameters	43
C.	Hydrogeologic Characterization	44
V.	SURFACE WATER	45
VI.	AIR	45
VII.	SAMPLING AND ANALYSIS PLAN	
A.	Sample Locations	46
B.	Sample Collection Procedures	46
C.	Sample Handling Requirements	47
D.	Analytical Methods	47
E,F,G.	Data Quality	48
VIII.	HEALTH AND SAFETY PLAN	49
IX.	MAPS	50

### PAIV - DATA EVALUATION REPORT

I.	SITE BACKGROUND AND OBJECTIVES	52
II.	SOILS	53
III.	GROUNDWATER	54
IV.	SURFACE WATER	55
V.	AIR	55
VI.	SUMMARY AND RECOMMENDATIONS	56



## APPENDICES

APPENDIX A	Supporting Historical Documentation
APPENDIX B	Site Maps
APPENDIX C	Koppers Product Description and Material Safety Data Sheets
APPENDIX D	Soil Analytical Summary
APPENDIX E	Groundwater Analytical Summary
APPENDIX F	Well Logs
APPENDIX G	Toxicity and Persistence Evaluation
APPENDIX H	Health and Safety Plan
APPENDIX I	Pre-Excavation Sampling
APPENDIX J	Quality Assurance and Control



## EXECUTIVE SUMMARY

Since the 1940's, Time Oil Co. has operated a petroleum products terminal in the Rivergate area of northwest Portland, Oregon, which provides tank storage facilities for its products. Time Oil Co. has, on occasion, leased tanks to outside customers for storage of their (customers') products; in these cases, Time Oil Co. has also provided product handling and distribution services. In an arrangement of this type, Time Oil Co. ran a Pentachlorophenol (PCP) blending operation for Koppers Company on a portion of the subject property from March 1, 1967 to March 31, 1982. This operation consisted of heating and mixing PCP granules with paraffin wax, mineral spirits and other similar solvents to yield various woodtreating products per Koppers' specifications. These products were then stored in tanks on site and later shipped to Koppers' customers in 55 gallon drums.

PCP is a light brown material in the solid form, and with a melting point of 360 degrees F., is a solid under most conditions. It is largely water insoluble, although it can be dissolved in water with the pH elevated to 10 or more. Its primary use is as a wood preservative when blended with various types of oil products. Details of its characteristics, as well as the characteristics of the various solvents it was blended with, are given in the Material Safety Data Sheets included in Appendix C.

At some time during the lease agreement between Time Oil Co. and Koppers, PCP was released into the soil adjacent to the warehouse in the Mixing Area. This material was probably released in combination with the various solvents used in the process. The primary cause for these releases appears to have been intermittent spillage from hoses, mixing vessels and daily operations, rather than a specific, large spill event.

Since the termination of the agreement between Time Oil Co. and Koppers, Time Oil Co. has been actively pursuing remediation of the contaminated area.

In 1984 the Oregon Department of Environmental Quality inspected this site. At that time samples were taken from throughout the site which showed no lead contamination, no pesticide contamination, no PCP contamination outside the limits of the PCP Mixing Area and warehouse, and very limited contamination by selected hydrocarbon compounds.



In 1985 Time Oil Co. began a program to excavate the contaminated soil for disposal at an appropriate landfill. Early in that year, approximately 290 cubic yards of the most contaminated soil were removed from the site and disposed of at Arlington, Oregon. Investigations continued to determine the exact extent of the contamination. However, before the remaining contaminated soil could be removed, PCP was reclassified as a hazardous waste bearing the number F027, and thus became ineligible for disposal at hazardous waste facilities in the United States.

Pending resolution of acceptable soil disposal techniques, Time Oil Co. switched their focus to determining if the groundwater had been contaminated. This involved installing an extensive network of groundwater monitoring wells and repeated sampling and analysis. This work indicated low levels of groundwater contamination, however, the results are somewhat inconclusive. In an effort to limit any possible continuation of groundwater contamination, the contaminated soil was excavated and stock piled in a bermed, lined area, and covered.

Since 1988 Time Oil Co. has been working with ECOVA Corp. to remediate the contaminated soil on site. Efforts originally were focused on soil washing techniques. These efforts were halted when it became apparent that meeting a "background" cleanup level of 0.5 mg/kg would not be practicable.

Currently, Time Oil Co. would like to work with the Oregon Department of Environmental Quality to set an achievable cleanup level that would be considered safe to both the environment and personal health, so that the contamination problem at the site can be remediated.

From the time significant contamination at the site was verified, Time Oil Co. has continuously pursued voluntary cleanup of the site, and compliance with environmental regulations. This report is submitted in furtherance of that policy.

This document is divided into four sections. The Preliminary Assessment Part I is a general site overview discussing the site history, and a description of the contamination problem.

The Preliminary Assessment Part II is a more detailed analysis of the situation. Descriptions of soil and groundwater contamination are given along with the available analytical information that was obtained prior to 1989.



The Preliminary Assessment Part III is an account of the work ECOVA Corporation has performed on site since 1989 and describes the objectives of the current site activities.

The Preliminary Assessment Part IV is a recommendation of future actions.



**PAI - PRELIMINARY ASSESSMENT PART I**



## **L GENERAL SITE DATA**

### **A SITE NAME**

Time Oil Co. Northwest Terminal

### **B SITE ADDRESS**

12005 North Burgard Road  
Portland, Oregon 97203

### **C SITE CONTACT**

Dick Basney  
Terminal Manager  
12005 North Burgard Road  
Portland, Oregon 97203  
(503) 286-1611

### **D CURRENT LEGAL OWNER AND OPERATOR**

Property is owned by Northwest Terminal Co., a wholly-owned subsidiary of Time Oil Co. located at 2737 West Commodore Way Seattle, Washington 98199-1233. Improvements are owned by Time Oil Co., which also operates the terminal. Contact for environmental affairs is Mr. Fred Proby at (206) 286-6444. Northwest Terminal Co. has owned the property since 1943.

### **E CURRENT OPERATOR**

Time Oil Co.



## **II. SITE DESCRIPTION**

### **A LEGAL DESCRIPTION**

The subject property is comprised of four parcels situated in Section 35 of Township 2N Range 1W: tax lot #18 (12.47 acres), #31 (32.40 acres), #63 (0.22 acres) and #38 (6.04 acres). Tax lots #18, #31, and #63 (45.09 acres total) are referred to as the "Northwest Terminal" and tax lot #38 is referred to as the "Bell Terminal"; both are operated by Time Oil Co.

### **B COORDINATES**

The Time Oil Co. facilities are located at approximately the following (unsurveyed) coordinates:

Longitude      122 degrees, 47 minutes West

Latitude        45 degrees, 37 minutes North

### **C ROAD DIRECTIONS**

From St. Johns, go north on Lombard, and turn left onto Burgard Road at the bend where Lombard turns into Columbia. Stay to the right at the first fork (approximately 1 block from Lombard), and follow the road around to the left (west). Where the road turns north, go straight (west) down driveway to Time Oil Co.

### **D TOTAL AREA OF SITE**

The Time Oil Co. facilities cover an area that is approximately 51 acres, but the area of contamination covered an area that originally was approximately 100 feet by 100 feet.

### **E DESCRIPTION OF LAND USES IMMEDIATELY SURROUNDING SITE BOUNDARIES**

The land surrounding the subject site is the Rivergate Industrial area. It is occupied by the Port of Portland facilities and heavy industrial complexes.





### **III. OWNERSHIP INFORMATION**

#### **A PAST LEGAL OWNER(S)**

Northwest Terminal Co. acquired title to the approximately 12.5 acres on which the warehouse and Mixing Area is located from Oregon Shipbuilding Corp. on December 2, 1943. The current address, telephone number and years of ownership of Oregon Shipbuilding Corp. are not known.

The approximately 40 acres to the east of the Mixing Area was acquired from the United States of America on May 20, 1950.

The property comprising the Bell Oil Terminal was acquired from William Shenker and others on September 9, 1953. His current address, telephone number and years of ownership are not known.

#### **B TYPE OF OWNERSHIP**

Corporate, government and private

#### **C PAST LESSEES OR OPERATORS**

Unknown



#### IV. SITE HISTORY AND POTENTIAL PROBLEMS

##### A SITE OPERATIONS

Since the 1940's, Time Oil Co. has operated a petroleum products terminal in the Rivergate area of northwest Portland, Oregon, that provides tank storage facilities for its products. Time Oil Co. has, on occasion, leased tanks to outside customers for storage of their (the customers') products; in these cases, Time Oil Co. has also provided handling and distribution services. In an arrangement of this type, Time Oil Co. ran a PCP blending operation for Koppers Company on a portion of the subject property from March 1, 1967 to March 31, 1982. This operation consisted of heating and mixing PCP granules with paraffin wax, mineral spirits and other similar solvents to yield various woodtreating products per Koppers' specifications. These products were then stored in tanks on site and later shipped to Koppers' customers in 55 gallon drums. The 1972 site map in Appendix B, Figure 1, illustrates the Time Oil Co. facilities configuration and shows the contaminated site at the time of these operations. Tanks No. 20001, 20002, and 20003 were leased to Koppers, as well as several smaller, above ground, horizontal tanks.

At some time during the lease agreement between Time Oil Co. and Koppers, PCP was released into the soil adjacent to the warehouse and Mixing Area. This material was probably released in combination with the several hydrocarbon solvents used in the process. The primary cause for these releases appears to have been intermittent spillage from hoses, mixing vessels and daily operations, rather than a specific, large spill event.

Following termination of Time Oil Co.'s agreement with Koppers on March 31, 1982, the tanks, piping, and related equipment were removed and soil samples were collected. These samples indicated that PCP had been released.

Upon removal of the equipment used in the PCP operation, plans were made to excavate and dispose of the contaminated soil. This was to be a three phase effort, fully coordinated with the Oregon Department of Environmental Quality (ODEQ). Phase I consisted of initial soil excavation and transport to an authorized disposal facility. Phase II involved a thorough investigation to determine the extent of PCP contamination. Phase III planned the removal and disposal of all contaminated soil with concentrations above acceptable limits.



Phases I and II were completed, but the ban on landfilling PCP contaminated materials impeded progress toward completion of Phase III.

## **B SITE EMERGENCY/REMEDIAL ACTIONS**

No "emergency" operations have been undertaken on the site with respect to the PCP operations. Remedial actions that have occurred at the site, and a summary of analytical information, are described in the following historical summary. A more thorough discussion of analytical information is included in Preliminary Assessment II under Soil Pathway and Groundwater Pathway.

1983

April

Bioassay tests indicated that surface soil from the PCP mixing area was toxic to juvenile Rainbow trout at soil concentrations of 100 and 1000 mg/l. The PCP concentration of this soil sample was not determined.

1984

April

Oregon Department of Environmental Quality (ODEQ) advised Time Oil Co. that the Northwest Terminal was to be inspected as part of ODEQ/EPA "hit list" of 44 companies.

October

ODEQ inspected the site and determined that soil samples should be collected and analyzed.

December

ODEQ collected 12 soil samples throughout the entire Mixing Area, of which one sample was in PCP area.

1985

January

Time Oil Co. received results of ODEQ soil sampling, showing 1820 mg/kg PCP in woodtreating area.

All 12 soil samples tested for EP Toxicity lead showed concentration of less than 0.1 mg/l.



All 12 soil samples were tested for 14 pesticides and showed concentrations of less than 5 mg/kg (the detection limit).

Samples tested for acid extractables (phenols) showed 10 of the 12 sites to contain less than 1 mg/kg (the detection limit). One sample contained 515 mg/kg PCP and 12 mg/kg tetrachlorophenol (this sample was taken near the site of tanks leased to Crosby and Overton).

The second sample which tested over the detection limit contained 1820 mg/kg PCP and 71 mg/kg tetrachlorophenol (this sample was taken at the site of the tanks leased to Koppers).

All 12 soil samples were tested for base-neutral extractables. Of these, nine of the 12 contained less than the detection limit (1 mg/kg).

#### February

On February 4, 1985, Time Oil Co. reiterated to the ODEQ its intent to excavate PCP contaminated soil and dispose of it at an approved disposal facility. This was done via a status update letter to ODEQ (Janet Gillespie).

Letter from John Smits of ODEQ to EPA describes history of site, waste handling practices, and recommendations for future actions (this letter is included in Appendix A).

#### May

DEQ approved "Disposal Request" for PCP contaminated soil at the hazardous waste facility at Arlington, Oregon.

#### June

"Waste Transportation and Disposal Agreement" executed with Chem-Security Systems, Inc. for disposal of soil at Arlington.

Between June 25 and June 28, 1985, 288 cubic yards (242 tons) of soil were removed and shipped to Arlington as part of the Phase I excavation described earlier. The soil was excavated to a depth of 2 to 4 feet in the northwest corner of the Mixing Area (documentation included in Appendix A).



On June 28, 1985, Time Oil Co. received a letter from the ODEQ laboratory concerning a previous interpretation by the agency. This letter stated that 600 mg/kg of total chlorophenols in soil and 0.15 mg/l in water represented the hazardous waste threshold. This conclusion was based on extraction and bio-toxicity tests performed by ODEQ. The letter did state that this was only to be used as guidance and did not necessarily reflect specific clean up requirements.

#### August

Following completion of the Phase I excavation, site characterization by Riedel Environmental Services showed that not all of the PCP contaminated soil had been removed. Samples were taken from 22 locations around the outside of the perimeter of the PCP Mixing Area south of the pentachlorophenol warehouse in an effort to determine the extent of contamination. Three composite samples were also taken in this area which showed concentrations up to 860 mg/kg. Additional samples were then taken from 81 sites just outside of the PCP Mixing Area and analyzed. Results indicated that PCP contamination was localized to the west and south of the warehouse, with little or no contamination occurring to the east of the site.

Soil was then collected from 14 locations at various depths from within the Mixing Area. Contamination contour maps indicated a maximum concentration of 26,500 mg/kg at the surface of the area where the loading of trucks had occurred during the Phase I excavation. A second point of high concentration was at the southwest corner of the PCP warehouse. These contour maps are presented in Appendix D. Analytical information for soil and groundwater is summarized in more detail in PA II under "Observed Releases" for Soil Pathway and Groundwater Pathway respectively.

#### November

Time Oil Co. retained Riedel Environmental Services to install four groundwater monitoring wells near the southwest corner of the PCP warehouse building (Wells 1, 2, 3 and 4). Soil samples were taken to expand the data from earlier analyses. Wells 1, 2 and 3 were slanted under the warehouse in an effort to determine the extent of contamination in that direction. Samples from the slant borings indicated PCP concentrations as high as 116,000 mg/kg at 2.5 to 4 feet below the surface; concentrations decreased with depth. A map of the well locations is provided in Appendix B, Figure 2.

#### December



On December 10, 1985, the Environmental Protection Agency, Region X, advised Time Oil Co. that soil contaminated with PCP had been reclassified from U242 to a hazardous waste bearing number F027. The EPA further advised that at that time there were no commercial hazardous waste facilities in the United States that would accept waste designated as F027.

Pending resolution of acceptable disposal techniques, Time Oil Co. switched the focus of its attention to determining if groundwater had been contaminated.

#### 1986

##### January

In order to identify groundwater flow direction and gradient in the area of the site, Time Oil Co. installed well points at three locations surrounding the PCP warehouse and Mixing Area. On February 12 the report was received on the operations associated with those wells. Two of the wells (A and B) were installed to a depth of 20 feet, and two wells were installed at location C to a depth of 8 feet. Water level measurements were taken on nine occasions in Wells A, B, C1, C2, and 4. The data indicated unexpectedly lower water levels in Well 4.

To further the investigation, three additional well points, four observation pits and a river level reference point were installed by Time Oil Co. in March, 1986. Wells E, F, and G were 20, 19, and 13 feet deep, respectively. Well C2 was removed. Water levels were again measured and supported the data of the previous water level measurements.

Analysis of the data indicated a strong likelihood that Well 4 had penetrated a low permeability zone and had not been completed in such a way as to prevent the perched water table from draining through the well bore.

##### May

In May, 1986, at Time's direction, three additional groundwater monitoring wells were installed by Riedel (Wells D, H, and I). The purpose of these wells was to further define the upper piezometric surface and to obtain data on groundwater quality.



Time Oil Co. also retained Century Environmental Sciences to perform groundwater sampling and analysis. Water level readings in Wells 4, A, B, C, E, F, and G indicated a persistent zone of depression around Well 4. Well 4 was subsequently over-drilled and sealed.

Analysis of water samples from Wells 4, B, and F indicated PCP concentrations of 6.1, 2.6, and 1.4 ppb respectively. A second group of water samples was taken from Wells A, B, D, E, F, H, and I. The only well which indicated PCP concentrations above detection limits was Well I, with a concentration of 2.2 ppb.

#### August

In August of 1986 SRH Associates was retained to perform additional sampling and analysis of soil and groundwater at the Time Oil Co. facility. Time Oil Co. had regraded the surface of the Mixing Area gathering all suspected contaminated surface soil into a centralized area, reducing the area to about 60 feet by 60 feet. SRH then collected surface soil samples from the same 14 locations in the Mixing Area which had previously been sampled by Riedel. Additionally, six holes were drilled through the warehouse floor and sampled soil beneath the building. Groundwater samples were also obtained from seven existing monitoring wells and analyzed. The results of this work are summarized in Appendix D, pages 14 to 26.

#### October

SRH Associates, Inc. evaluated twelve alternative cleanup technologies and recommended soil washing as the most logical clean-up approach, followed by Surface Mounted Thermal Extraction and In-Situ Thermal Extraction. The report recommended performing bench and pilot scale evaluations. At the time, these technologies were still in the experimental stage, so Time Oil Co. chose to seek other treatment approaches.

#### 1988

#### September



Time Oil Co. received a work plan from ECOVA for soil and groundwater remediation using biological treatment in above-ground reactors. Three alternative clean up levels were evaluated - 500, 100, and 50 mg/kg.

Time Oil Co. contacted ODEQ (Ed Woods and Tom Miller) to determine DEQ's role and was advised that ODEQ did not necessarily need to approve the treatment process, but would need to sign-off that the cleanup had been effectively completed.

October

ECOVA's Work Plan was amended to set a final cleanup level of 0.5 mg/kg PCP, the practical quantitation limit using standard test procedures. This concentration was selected to reflect ODEQ's goal of remediating to "background" levels.

December

Received notification from ODEQ (letter dated 11/30/88) that facility was listed on "Inventory of Confirmed Releases", site identification number 170.

1989

April - October

To reduce the potential for groundwater contamination, the contaminated soil was excavated and stock piled in a bermed, lined storage area next to site of original contamination. ECOVA performed biological slurry treatment on 10 yards of soil from the stock pile, and achieved reduction of PCP from approximately 250 to 50 mg/kg. Further biodegradation was inhibited by the presence of mineral spirits and related solvents used in the PCP formulation.

1990

January - March

Field studies by ECOVA indicated that, under the existing soil conditions, biodegradation of PCP to 0.5 mg/kg would not be practical. The lowest concentration that could be practically achieved was determined to be 100 mg/kg.

1991

December





Time Oil Co. submits plan to ODEQ for soil cleanup under the voluntary cleanup program.

**C DESCRIPTION OF PRIOR SPILLS**

As mentioned above, at some time during the lease agreement between Time Oil Co. and Koppers, PCP were released into the soil adjacent to the warehouse and Mixing Area. This material was probably released in combination with the mineral spirits and other solvents which were used in the process. The primary cause for these releases appears to have been intermittent spillage from hoses, mixing vessels and daily operations, rather than a specific, large spill event.

During an October 25, 1984 site visit by the ODEQ, the 20,000 gallon storage tanks were inspected. There was obvious visual contamination of the soil by incidental spills in this former handling area. The tanks were later removed.

**D SAMPLING AND ANALYSIS DATA**

Copies of all supporting documentation including sampling and analyses are contained in Appendix A in chronological order and are described briefly above in PA I, Section IV, Subsection B. Detailed descriptions of soil and groundwater sampling and analyses are included in PA II, Sections I and II.

**E BIBLIOGRAPHY OF ALL FILES, REPORTS REVIEWED**

The following documentation is included in Appendix A in support of this report under the referenced subsections of that appendix:

- A "Northwest Terminal Woodtreating Chronology of Events"
- A-1 Department of Environmental Quality "Request for Analysis" for samples taken, December 12, 1984.
- A-2 Letter from John L. Smits (ODEQ) to Debbie Flood (EPA Region X) describing site conditions, February 12, 1985.
- A-3 Letter from ODEQ (Richard F. Gates) to Time Oil Co. giving 600 mg/kg as the hazardous waste threshold, June 28, 1985.



- A-4 Results of sample analysis for North West Vacuum Truck Service, February 19, 1985.  
Documentation for excavation of 240 tons of contaminated soil by Chem-Security systems, July 29, 1985.
- A-5 Letter from Riedel Environmental Services, Inc. to Time Oil Co. giving sample results, August 15, 1985.  
Report to Time Oil Co. from Riedel Environmental Services, October 18, 1985.
- A-6 Letter from George C. Hofer (EPA - RCRA Permits Section) to Time Oil Co. giving notice that PCP will no longer be accepted at hazardous waste facilities, December 10, 1985.
- A-7 Report to Time Oil Co. from Riedel Environmental Services, February 4, 1986.
- A-8 Time Oil Co. internal memo from Fred Proby on groundwater investigation, May 2, 1986.
- A-9 Report to Time Oil Co. from Century Environment Sciences, June 4, 1986.
- A-10 Report to Time Oil Co. from SRH Associates, Inc., October 1, 1986.
- A-11 Report to Time Oil Co. from SRH Associates, Inc., November 5, 1987.



## **V. HAZARDOUS WASTE CHARACTERIZATION**

### **HAZARDOUS MATERIALS AND TYPES**

PCP is a light brown material in the solid form, and with a melting point of 360 degrees F., is a solid under most conditions. It is largely water insoluble, although it can be dissolved in water with the pH elevated to 10 or more. Its primary use is as a wood preservative when blended with various types of oil products.

Appendix C describes all of the chemicals used in the wood treating operation. It contains the following:

- An industry brochure distributed by Koppers which describes the products which were produced at the site.
- A safety bulletin which describes "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol."
- Material Safety Data Sheets for all of the Koppers products and ingredients, which includes formulas for their wood treating products. As these chemicals were used in the PCP operations on the site, they were released as part of the PCP mixture, and thus are be present in the PCP contamination areas.

### **B WASTE GENERATION**

The volumes of hazardous materials and wastes generated annually is unknown. The total volume of PCP contaminated soils is estimated to be 3000 cubic yards based on a survey of the stock piled soil.

### **C WASTE TREATMENT SYSTEMS**

No PCP waste treatment systems were in operation at the site.



**D PERMITS**

On August 11, 1980, Time Oil Co. completed EPA form 8700-12, Notification of Hazardous Waste Activity, as required by RCRA Section 3010. On February 22, 1982, Time Oil Co. requested assignment of a generator identification number by correspondence with the Department of Environmental Quality.

**E PERMIT VIOLATIONS**

There have been no known violations of the above-noted permits.

**F HAZARDOUS WASTE DISPOSAL**

On June 25, and 28, 1985, 243 tons of the most heavily contaminated soil were removed from the surface of the PCP mixing area. The Uniform Hazardous Waste Manifests documenting the removal and proper disposal of this material are provided in Appendix A, with the letter dated July 29, 1985 from Time Oil Co. to Chem-Security Systems, Inc. This constitutes the only removal of PCP contaminated soil from the site by Time Oil Co.



## VL WASTE CONTAINMENT

The PCP arrived at the site in granular form in 55 gallon drums. The solvents arrived in hogsheads. Materials were blended per Koppers specifications (Appendix C), and were stored in tanks 20001, 20002, and 20003, which were 20,000 gallon tanks, and several smaller horizontal, rectangular tanks. These tanks were located to the south of the PCP warehouse in the PCP Mixing Area, as shown on the map in Appendix B, Figure 1. All of these tanks and their associated piping were removed in 1984.

The area containing the PCP solution storage tanks was surrounded by a concrete bulkhead, which was approximately three feet high. This Mixing area was approximately 60 feet in the north-south direction, and 80 feet in the east-west direction. The wall on the west side was decontaminated and demolished in November, 1985, after the tanks were removed. This was the only known secondary containment structure.

The total volume of PCP material spilled at the site can not be accurately determined, since it was the result of an accumulation of small incidents, not a documented event. Excavation activities, subsequent sample taking and analysis, and surveying of the stock piled soil give an approximate volume of 3000 cubic yards of soil that have been impacted.

In July of 1985 Riedel International performed sampling and analysis services at the site. The results of this work is included in Appendix D. Using this data as a basis, an average concentration of 945 mg/kg has been calculated.

The activities that resulted in the contamination under investigation consisted of a simple operation wherein solvents were heated and mixed with PCP to produce a variety of wood treating products. The finished product was stored in tanks, as described above, and then shipped to customers of Koppers. The only waste materials produced by this operation were empty packaging, tanks, drums and buckets with residual PCP and the soil contaminated by spilled PCP.



## **VII. USGS TOPOGRAPHIC MAP**

Topographic maps for the Time Oil Co. site and the surrounding region are included in Appendix B, Figures 3 and 4.



## VIII. SITE MAPS

Detailed maps of the Time Oil Co. Northwest Terminal showing the location of the PCP blending area are included as Appendix B, and are described below:

- Figure 1 is a drawing from 1972 of the site which shows the PCP Mixing Area as it existed during the blending operations.
- Figure 2 is a drawing showing the area of contamination and the location of monitoring wells.
- Figures 3 and 4 are topographic maps showing the immediate vicinity around the Northwest Terminal Site.



## IX. SUMMARY AND RECOMMENDATIONS

Pentachlorophenol has been spilled on the facilities of Time Oil Co. and has created a contaminated site. Work performed by several consulting groups consistently indicates that the extent of PCP contamination is limited to the PCP mixing area.

Time Oil Co. has, from the early stages of this problem, taken an active, self-motivated approach to cleaning up their facilities. The site has been thoroughly characterized and full-scale field trials have demonstrated that soil washing and biological degradation is an effective remediation method. It is therefore recommended that this method be used to remediate PCP contaminated soils to a level acceptable to the ODEQ.





**PAII - PRELIMINARY ASSESSMENT PART II**



## I. SOIL PATHWAY

### A OBSERVED RELEASES

As mentioned in PAI - Section VI Waste Containment, no specific incidents of PCP spills have been documented at the site. Accordingly, "observed releases" is best described through a discussion of analytical information indicating the extent of contamination. The following discussion summarizes the sampling and analytical work which was performed on the Time Oil Co. site prior to 1988. Work done on the site after 1988 by ECOVA is included in Preliminary Assessment Part III.

Analytical work began with fish bioassay tests performed in February of 1983. These tests indicated that the soil from the former PCP mixing area was toxic at the 100 to 1000 mg/kg levels.

During an October 25, 1984 site visit by Oregon Department of Environmental Quality, there was visual evidence of soil contamination in the former PCP Mixing Area. On that date, the DEQ advised their intent to collect soil samples throughout the facility. ODEQ laboratory personnel collected twelve soil samples on December 12, 1984 from the entire facility, using a soil core. The sample locations are shown on Figure 6 in Appendix B. Soil for a composite at each location was sampled at the ground surface, and at 1, 2, and 3 foot intervals. Analysis performed on each sample included base-neutral extractables, pesticides/PCBs, acid extractables, pesticides and EP Toxicity for lead. An effort was also made to identify and quantify any other organic chemicals observed with the extraction GC/MS (gas chromatograph/mass spectrometer) procedures.

All 12 soil samples showed concentrations of lead of less than 0.1 mg/l, the detection limit. Concentrations of 5 mg/l or greater for EPA Toxic lead are classified as hazardous waste.

Of 12 soil samples tested for fourteen pesticides(RCRA method 625, extracted by RCRA method 3540), all showed concentrations of less than 5 mg/kg, the detection limit for these pesticides.

Samples for acid extractables (RCRA method 625, extracted by RCRA method 3540) showed all 12 sites to contain less than the 1 mg/kg detection limit for these phenol species except for two samples from the PCP storage area - samples 9 and 10. The results are summarized in the following table.



# ODEQ ANALYSIS FOR ACID AND BASE-NEUTRAL EXTRACTABLES

	Sample 4	Sample 8	Sample 9	Sample 10
ACID EXTRACTABLES				
Pentachlorophenol	-	-	515 mg/kg	1820 mg/kg
Tetrachlorophenol	-	-	12 mg/kg	71 mg/kg
BASE-NEUTRAL EXTR.				
Isophorone	1 mg/kg	-	-	-
2,4-dinitrotoluene	3 mg/kg	-	-	-
Fluorene	1 mg/kg	13 mg/kg	-	-
n-nitrosodiphenylamine	2 mg/kg	-	-	-
Phenanthrene	1 mg/kg	14 mg/kg	-	-
Anthracene	1 mg/kg	105 mg/kg	-	-
Chrysene	-	-	1 mg/kg	-
bis(2-ethyhexyl)phthalate	-	-	3 mg/kg	-

Also summarized in the above table are the results of the base-neutral extractables, method 625, extracted by RCRA method 3540. All showed non detectable concentrations except for samples 4, 8, and 9. Although polychlorinated biphenyls (PCBs) were detected at several soil sample sites, total PCBs were well below the 50 mg/kg concentration which requires handling. The analytical results from these samples are included in Appendix A.

Following coordination with the DEQ, the Arlington landfill, and local contractors, 24.76 tons (7781 cubic feet, or 288 cubic yards) of PCP contaminated soil were hauled to Arlington, Oregon. The contamination level of a sample of this soil was 1820 mg/kg PCP. Documentation of the soil removal is included in Appendix A. Continuation of this effort was later halted due to a moratorium on landfilling of PCP contaminated soils.

In October of 1985 Riedel Environmental Services submitted a report (included in Appendix A) detailing the results of their soil sampling operations conducted in July of 1985. A summary of the analytical results is also provided in Appendix D, pages 1 through 13. This contains a list of PCP concentrations in the samples and a contour map showing PCP distribution at various depths.



This data shows high concentrations of PCP immediately to the southwest of the PCP warehouse and a second area which was used as a loading area for blended products. PCP concentrations at these two areas were 13,500 and 26,550 mg/kg respectively. Page 13 gives the analytical results of three preliminary surface composite samples taken from outside the perimeter of the Mixing Area. The samples were collected from the west, south, and east directions and analysis indicated PCP concentrations of 660, 860, and 17 mg/kg respectively.

In February of 1986 Riedel Environmental Services submitted a report (included in Appendix A) on a November 1985 field investigation in which four wells were installed near the southwest corner of the PCP warehouse. Soil samples were taken during installation. The samples from Wells 1, 3, and 4 were analyzed for PCP. The results are summarized below. PCP concentrations are presented in parts per million.

Depth (feet)	Well #1	Well #3	Well #4
0 - 1.5	1690	65.3	-
2.5 - 4	16.8	116000	-
7.5 - 9	886	11000	-
16 - 17.5	110	-	-
17.5 - 19	-	1560	-
18.5 - 20	-	-	574
32.5 - 35	-	-	62.3
43.5 - 45	-	-	1.59
47.5 - 49	-	-	2.81

In August, 1986, Time Oil Co. re-graded the contaminated area in an effort to consolidate the contaminated soil and keep it localized. After re-grading, SRH Associates took samples from the same 14 locations in the Mixing Area as Riedel. SRH also drilled six holes in the warehouse floor and collected samples underneath the warehouse. The results of the analysis are given in Appendix D, pages 14 to 26. This analysis indicates that although the soil does contain some amounts of PCP, these amounts are very low - average concentration for 30 samples is .5 ppm with only 5 samples having detectable amounts of PCP.



Later, in 1989, Time Oil Co., through the services of ECOVA Corporation, excavated approximately 3,000 yards of contaminated soil and placed it in a bermed, protected area. Sampling of the excavated pit at the time indicated that all of the contaminated soil had been removed, except for soil under the southwest corner of the warehouse. This soil remained unexcavated due to fear of structural damage to the warehouse. This work is described in detail in Section PAIII.

#### **B ACCESSIBILITY**

Time Oil Co. site in Portland is a restricted access area. The site is completely fenced and access is controlled by a gate which can be opened only with a pass card. The site has a 24 hour guard and operations typically may occur at all hours of the day.

Currently, the possibility of exposure to contaminated soil is limited, since the contaminated soil has been excavated, placed in a lined, bermed, storage area and covered with a tarp.

Although site personnel have access to the area, there are no routine operations that would expose workers to the contaminants.

#### **C CONTAINMENT**

There were no containment facilities to prevent spilled PCP mixtures from reaching the soil. A cement bulkhead surrounding the PCP Mixing Area had served to contain spills to that immediate area.

Currently the contaminated soil is covered in a bermed and lined storage area.

#### **D HAZARDOUS SUBSTANCE**

The hazardous substances of concern at the site are PCP and various petroleum based solvents used in the blending process for making wood treating products. The solvents include mineral spirits, ketones, and other hydrocarbon products. Product and Material Safety Data Sheets are located in Appendix C. Also included with this material is "Safety Measures and Precautions for Handling Solutions Containing Pentachlorophenol."



PCP was the most hazardous substance used at the facility. A toxicity/persistence evaluation of the characteristics of PCP was conducted using the method described in Appendix G. PCP's combined toxicity/persistence rating factor, using that method, is 15. Persistence of each hazardous substance is evaluated on its biodegradability. PCP exhibits a ring compound structure, and is assigned a persistence value of 2. Toxicity of each hazardous substance being evaluated is given a value using the rating scheme of Sax or the National Fire Protection Association (NFPA). PCP has a rating of Level 3, and is assigned a toxicity value of 3. These values for toxicity and persistence give a combined rating of 15.

PCP's IDLH level (Immediately Dangerous to Life or Health) is 150 mg/m<sup>3</sup>. It is not considered a carcinogen by the National Institute for Occupational Safety and Health.

#### **E SITE/SOIL GEOLOGY**

It is believed that much of the site has been built up with hydraulic fill from dredging the Willamette River. Soil type consists of fine to medium grained sands and minor amounts of silts and gravels. These soils are normally associated with a former river channel deposit of the Willamette River. Little clay appears to be present near the surface, although lenses may occur at depth. Well Completion Forms for ECOVA Wells J1, J2, J3, B1, B2, G1, and G1A provide a more detailed description of subsurface soils (Appendix F).

#### **F TARGETS**

##### **1 On-site Population**

The total number of people employed at the Time Oil Co. Portland is approximately ten. Personnel do not routinely work or reside on or near the area of PCP contamination.

##### **2 One Mile Population**

United States Geological Survey Topographic Maps were inspected to determine the number of residences in the vicinity. The total residential population within a one-mile radius of the site is estimated at 35 people (approximately 15 residences), and appears to be concentrated near Harborton, on the opposite bank of the Willamette River. There are no residences on the contaminated property.

##### **3 Terrestrial Sensitive Populations**



The entire site has been disturbed, so there are no natural flora or fauna resident on the site, other than opportunistic species such as mice, rabbits, and birds.



## II. GROUNDWATER PATHWAY

### A OBSERVED RELEASES

The following discussion summarizes groundwater sampling and analysis work that has been conducted on the Time Oil Co. site prior to 1988. Work conducted after 1988 by ECOVA Corporation is included in Preliminary Assessment Part III.

#### 1985

November, Riedel Environmental Services

In November, 1985 Riedel Environmental Services installed three shallow and one relatively deep well (Well 4) near the southwest corner of the PCP warehouse. A detailed evaluation of the boring log data for Well 4 showed that a series of clay lenses and silty sands were encountered between depths of 18.5 and 35 feet. This zone of low permeability (an aquitard) appeared to be separating a perched upper water-bearing zone from a separate underlying aquifer.

The boreholes were drilled with a 16-inch-diameter hollow-stem auger. Each well was constructed using 4-inch PVC casing and screen. Unfortunately, during construction of Well 4, the annular space was filled with coarse sand to a level extending above the aquitard. This provided a pathway for potentially contaminated water from the upper perched zone to flow into the lower aquifer. This also appeared to have altered the natural direction of groundwater flow within a zone of influence surrounding Well 4. Although the observed water table depression could represent a strong, natural vertical gradient in the vicinity of Well 4, the influence of this well on adjacent wells indicated a strong probability of an induced groundwater sink caused by the unsealed annulus of Well 4. This conclusion was reached by Time Oil Co. upon evaluation of the piezometric surface, of the perched water, which indicated that wells in close proximity to Well 4 were apparently influenced by Well 4, showing water level depressions, while wells distant from Well 4 were unaffected. The water level in Well 4 was also found to fluctuate with levels in the Wilamette River, whereas water in the other wells did not.





In an effort to reinstate natural groundwater flow patterns in the area and to eliminate possible intercommunication between upper and lower water bearing zones, Well 4 was removed by overdrilling and the hole sealed on May 14, 1986.

#### 1986

April, Century Environmental Sciences

Century Environmental Services performed water level measurements and collected samples for PCP analysis on wells which had been installed by Time Oil Co. The results are summarized in the table at the end of this section.

May 28, Century Environmental Sciences

Following abandonment of Well 4, a second group of groundwater samples were collected from Wells A, B, D, E, F, H, and I. Of the seven wells sampled, only Well I showed a detectable PCP concentration (2.2 ppb). The analytical results are listed in the table at the end of this section.

August 29, SRH Associates

Groundwater was sampled at seven monitoring points and was analyzed for pH and PCP. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River level elevations. Of the seven wells sampled, only Well D showed detectable PCP concentrations (44 ppb). Wells C and G were dry and could not be sampled. The sample analytical data are included in Appendix E and are summarized in the table at the end of this section.

#### 1987

August 20, SRH Associates

Groundwater was sampled at the nine monitoring points (Wells A through I) and analyzed for PCP. Static water levels were determined in these wells and at a monitoring station for the measurement of Willamette River water elevations. A PCP concentration of 2300 ppb was detected in Well B. No contamination was observed in Wells A, D, F, H, and I. Wells C, E, and



G were dry and could not be sampled. Results of the sampling analyses are provided in Appendix E and are summarized in the table at the end of this section.

October 16, SRH Associates

Well B was resampled to verify the August 20 analysis. A PCP concentration of 1000 ppb was subsequently determined.

#### SUMMARY OF WELL SAMPLING AND GROUNDWATER ANALYSIS

<u>Well No.</u>	<u>April '86</u>	<u>May '86</u>	<u>Aug '86</u>	<u>Aug '87</u>
A	-	N.D.	N.D.	N.D.
B	2.6	N.D.	N.D.	2300
C	-	N.D.	N.A.	N.A.
D	-	N.D.	44	N.D.
E	<1.0	N.D.	N.D.	N.A.
F	1.4	N.D.	N.D.	N.D.
G	-	-	N.A.	N.A.
H	-	N.D.	N.D.	N.D.
I	-	2.2	N.D.	N.D.
4	6.1	-	-	-
RIVER	-	-	N.S.	N.S.

#### **B ROUTE CHARACTERISTICS**

Shallow groundwater exists in the alluvial sands of two aquifers underlying the site. An unconfined upper zone of perched groundwater occurs at a depth interval between about 13 and 18 feet below ground surface.

A silt to clay aquitard, about two feet thick, separates the perched zone from a lower, confined zone that maintains an average water level of approximately 20 feet below ground surface. Groundwater flow is towards the Willamette River, with fluctuations related to tides and seasonal river stages. The aquitard appears to pinch out or terminate toward the river. It is likely that the perched water flows somewhat downward and laterally before entering the river.



As subsurface soils appear to be generally quite permeable, groundwater flow can be expected to be fairly rapid (100-200 feet/year). In August and October 1987, water levels and groundwater samples were obtained from the site wells. These measurements confirmed that groundwater was flowing in a southerly direction under an average gradient of 0.008 ft/ft. The estimated annual net precipitation averaged over 20-30 years is approximately 36 inches.

The physical state of the PCP-containing wood-treating chemical at the time of release was that of a liquid, approximately the consistency of a light oil.

#### **C      CONTAINMENT**

To halt the migration of PCP contamination from the contaminated soil into the groundwater, ECOVA Corporation excavated the contaminated soils. The soils were screened and placed in lifts on a stockpiled area lined with a 12 mil polyethylene plastic liner. A low earthen berm surrounds the stockpile and contains any contaminated rainfall runoff, and a plastic lined sump area catches and accumulates water. Any captured groundwater is pumped into the recovered groundwater storage tank. An equipment decontamination area is located within the bermed, lined area to provide for cleaning of the earthmoving equipment. A steamcleaner is used to assure that decontamination is thorough. Decontamination fluids accumulated in the sump will be treated in the treatment system after startup.

The stockpiled soil was covered by six mil polyethylene plastic sheeting to control airborne dust emissions during storage. The sheeting has been carefully weighted to prevent damage by the high winds occurring periodically in the Willamette River valley.

#### **D      HAZARDOUS SUBSTANCES**

PCP is the most hazardous substance at the facility. Its presence in the groundwater is low and inconsistent. The mobility of PCP in groundwater is limited to the mobility of the solvents, as it is generally not water soluble at a pH less than 10.

#### **E      TARGETS**

The shallow water-bearing sediments directly underlying the site are not a source of drinking water in the area. Monitoring well data indicates that groundwater in the shallow units appears to flow toward the



Willamette River. Users of water from the Willamette may, therefore, be indirect receptors of any site groundwater contamination. The potential for vertical (downward) migration of groundwater contaminants is not known.

There are three possible alternatives for attaining groundwater standards at the site:

- Maintain present PCP concentrations
- Reduce levels of PCP concentration
- Prevent any contaminant migration

Present concentrations in the site groundwater pose no direct threats to human health and the environment. The degree of variation in current levels is unknown due to the lack of long-term monitoring data; it is expected that these levels will decline as the source (soil) is treated.



### III. SURFACE WATER PATHWAY

The major surface water feature of the site is the adjacent Willamette River. No tributary streams run through the site and/or drain to the Willamette. Other than the immediate shoreline area, no portion of the site drains to the Willamette River.

The area of contamination is approximately 1/4 of a mile from the banks of the Willamette River. Because the site is composed of sandy soils of high permeability, all surface waters percolate into the soil and become groundwater immediately.

There have been no direct releases to surface water features (the Willamette River) at the site. Therefore, any communication between the area of contamination and the river must occur via groundwater pathways.

Due to the lack of surface water features at the site, there are no direct receptors of potentially contaminated surface water runoff.

No analytical testing for hazardous substances has been performed on any adjacent water features.



#### IV. AIR PATHWAY

PCP is a solid at room temperature. Possibility of air borne contaminants come primarily from wind blown particles such as dust. The stock piled, contaminated soil is currently covered and poses no threat to air quality.

No program of ambient (background) air quality monitoring has been performed for the site. The currently stock piled soil has been covered by six mil polyethylene plastic sheeting to control airborne dust emissions during storage. The sheeting has been carefully weighted to prevent damage by the high winds occurring periodically in the Willamette River valley.

With regard to on-site volatile organic emissions and possible fugitive dust, the long-term objective is to keep any air contaminant concentrations to background concentrations. During remedial actions, however, the objective will be to limit concentrations to OSHA standards.

As mentioned earlier, the only potential targets for volatile emissions are the staff of Time Oil Co. who work on site. Their exposure is being minimized by covering the contaminated soil with tarps.



## V. SUMMARY AND RECOMMENDATIONS

Time Oil Co. owns and operates a petroleum products terminal in Portland, Oregon, that provides tank storage facilities for its own and customers' products. From 1967 to 1982 Time Oil Co. ran a PCP blending operation for Koppers Company on a portion of Portland facility. PCP was heated and mixed with a variety of petroleum based carriers to meet Koppers' specifications; the finished product was then shipped off-site.

Following an inspection of the overall facility in 1984, the Oregon DEQ collected and analyzed soil samples from twelve locations including the PCP mixing area.

In 1985, 288 cubic yards of soil were removed from the PCP area and disposed of at the hazardous waste landfill in Arlington, Oregon. Further site sampling revealed that not all of the PCP contaminated soil had been removed. Before additional quantities could be excavated and disposed of, however, the EPA banned the landfill of PCP contaminated soils (1985).

In 1986 and 1987, Time Oil Co. installed groundwater monitoring wells in the area surrounding the PCP Mixing Area to investigate possible groundwater contamination, performed additional soil sampling and initiated an evaluation of site cleanup alternatives. Analysis of water samples indicated limited, low, and inconsistent concentrations of groundwater contamination.

Sample analyses have shown that PCP contamination in soil is limited to the mixing area. This area was excavated in 1989 and approximately 3,000 cubic yards of contaminated soil has been stockpiled in a bermed and lined area on site.

Sufficient site characterization has been performed to identify all contaminants and pathways and it has been determined that exposure is limited to on site personnel. Remediation will reduce this exposure to an acceptable level.



**PAIII - WORK PLAN**





## **I. BACKGROUND AND OBJECTIVES**

The Preliminary Assessment - PAIII - Work Plan describes the activities undertaken by Time Oil Co. and ECOVA Corporation toward the objective of reducing PCP concentrations in site soils to levels that would be considered environmentally safe. A history of site activities and a description of early efforts to determine the extent of contamination at the site were presented in Section PAI/II.

Discussions with Oregon Department of Environmental Quality (ODEQ) representatives indicated that through an examination of the details concerning contamination at the subject site, and a review of Records of Decisions regarding cleanup levels at other sites, an achievable, environmentally safe, site specific cleanup level for the soil at the subject property could be agreed upon by ODEQ and Time Oil Co.

This section, PAIII - Work Plan, summarizes the activities of ECOVA at the site from 1989 to the present, and the following section, PA IV - Data Evaluation Report, provides a discussion and proposal of potential cleanup levels.

### **A SITE DESCRIPTION / HISTORY / OPERATING PRACTICES**

Time Oil Co. owns and operates a petroleum products terminal in Portland, Oregon, that provides tank storage facilities for its own and customers' products. From 1967 to 1982 Time Oil Co. ran a PCP blending operation for Koppers Company on a portion of the Portland facility site. PCP was heated and mixed with a variety of carriers to meet Koppers' specifications; the finished product was then shipped off-site. Following an inspection of the overall facility in 1984, the Oregon DEQ required the collection and analysis of soil samples from various locations throughout the facility, including the PCP Mixing Area. In 1985, 288 cubic yards of soil were removed from the PCP area and disposed of at the hazardous waste landfill in Arlington, Oregon. Further site sampling revealed that not all of the PCP-contaminated soil had been removed. Before additional quantities could be excavated and disposed of, however, the EPA banned the landfill of PCP-contaminated soils (1985). In 1986 and 1987 Time Oil Co. installed groundwater monitoring wells in the PCP area and initiated an evaluation of site cleanup technologies. A report by SRH Associates evaluated the following technologies:

Adsorption onto Polymers or Activated Carbon

Biodegradation



Capping in Place  
Chemical Reduction  
Closure in Place with Monitoring (No remedial actions)  
Encapsulation  
Excavation and Disposal  
High Temperature, Catalyzed Oxidation  
Incineration  
In-Situ Soil Washing and Surface Mounted Soil Washing  
In-Situ Thermal Extraction and Surface Mounted Thermal Extraction  
Sodium Dehalogenation

In 1988 ECOVA was retained to evaluate the feasibility of biologically treating the PCP-contaminated soils. Initial treatability experiments indicated PCP could be degraded in this manner.

Bench scale tests indicated that soil washing might be an effective method of removing the PCP from the soil. Bioremediation methods could then be used to degrade the resultant contaminated liquor.

Full Scale operations were initiated to process the contaminated soil with a target cleanup goal of 0.5 mg/kg, the detection limit for PCP. During scale up operations, several soil washing experiments were carried out using different types of mechanical and chemical (high pH) agitation. It was found that PCP could be readily biodegraded, however, the 0.5 mg/kg cleanup level was not achievable within a practical time frame. Further analysis indicated the presence of mineral spirits, paraffin and other previously unknown solvents. It was believed that these materials were inhibiting the soil washing and biodegradation process. A recent article in the journal "Remediation", summer 1991, describes in detail the work performed at this site. That article is reproduced here as Appendix K.

Further discussions with ODEQ personnel and an investigation of existing environmental policies, indicated that required cleanup levels were determined on a case by case basis. It was believed that the published cleanup level of "background" served as a basis to work from, and that it was possible to negotiate an appropriate cleanup level which reflected the conditions at the site of contamination. An investigation of



Records of Decisions indicated that, in the past, ODEQ had authorized high PCP cleanup levels at other Oregon sites.

Time Oil Co. excavated as much contaminated soil as possible, and stock piled the soil in a bermed, lined area. This decision was made in order to isolate the contaminated soil from groundwater, and limit any personnel exposure.

## **B SUMMARY OF SAMPLING INFORMATION**

Prior to excavation of the contaminated soil, ECOVA performed final sampling and analysis of the PCP-contaminated area to determine the extent of contamination. This was due, in part, to the fact that Time Oil Co. had regraded the area, and transported the contaminated soil into a localized area over the original "hot spot" near the southwest corner of the PCP warehouse. This was done in order to limit the spread of contamination and to reduce leaching of contamination into groundwater.

Previous efforts at sampling and analysis had focused on contamination within the confined PCP Mixing Area and the immediately surrounding area. This pre-excavation sampling determined the limits of contamination. Furthermore, as excavation proceeded, continuous sampling helped determine the vertical limits of contamination.

Surface samples taken throughout the tank farm area south of the Mixing Area and the area to be used for stockpiling the soon to be excavated soil indicated on drawing 1E in Appendix I. These samples indicated non detectable amounts of PCP, except for samples taken to the west side of tanks 38009, 5006 and 10002.

Appendix I contains the information pertinent to this sampling and analysis activity. Figures 1A, 1B, 1C, 1D, and 1E are maps of the PCP Warehouse and Mixing Area and the surrounding facilities. Noted on the figures are the locations, depths, and PCP concentrations of samples which were taken during the first four months of 1989 during soil excavation, as described below. Table 1 in Appendix I contains a summary of this information and is followed by a written description of those samples.



The remaining samples were taken in the excavation pit during excavation in an effort determine the extent of contamination.



## **C OBJECTIVES OF PROPOSED SAMPLING AND ANALYSIS**

Contaminated soils, within the limits of the facilities and structures on location, have been excavated and stockpiled safely. There is no question that some soils PCP-contaminated soils remain unexcavated. However, soils in place with large total amounts of contamination are capped (by the warehouse). Other sources of contaminants in place are believed to be a combination of relatively low concentrations of PCP and low volumes of soils. While it may be desirable to treat these soils in situ at a later date, or excavate them in some way, the focus of this report is to emphasize the need to determine an achievable and appropriate, site specific, cleanup level for the stock piled soil. Once this level has been agreed to and processing of the stock piled soil begun, efforts toward treating in situ soils can be assessed, if desired.

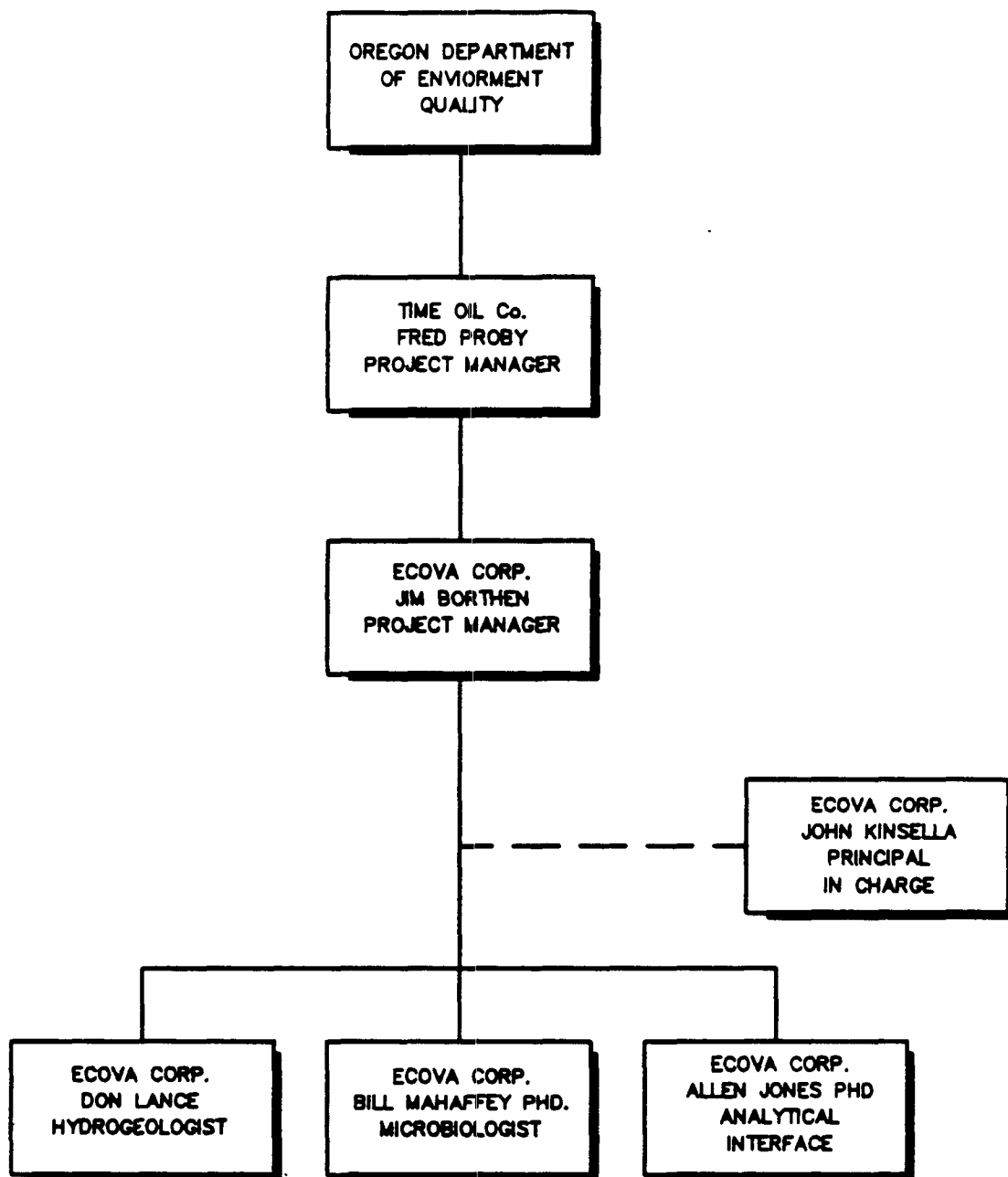


## II. PROJECT ORGANIZATION AND RESPONSIBILITIES

The following Figure 1 contains the organization chart for this project.



FIGURE 1. TIME OIL Co. – Northwest Terminal Project Project Organization



### **III. SOILS**

#### **A PROPOSED SOIL BORINGS**

At this juncture, it is not our recommendation that further sampling be performed on site. Contaminated soil has been excavated to the extent of contamination or to the limits imposed by on-site structures.

The focus of current efforts is toward establishing an achievable cleanup level so that processing of currently stockpiled soil can begin. Once a cleanup level is determined, and soil has begun processing, areas of contamination can be re-examined, and the cleanup level can be used as a guide as to which areas of contamination require attention.

It is also noteworthy that current facilities for stockpiling soils are full. If additional soil is found to require treatment, excavation will have to wait for removal of soil from the stockpile.

#### **B SOIL TYPES**

Soil types are described for previously drilled soil borings in Appendix F. They are visual - manual descriptions performed by licensed geologists. The results of OVA analyses of the excavation at the 4 foot level are described in Section I.





#### IV. GROUNDWATER

##### A WELL INSTALLATION

ECOVA installed six groundwater monitoring wells at the subject site from November 1988 to January 1989. The purpose of the wells was to characterize subsurface conditions and help define the lateral and vertical extent of site contamination. A site map showing all monitoring well locations at the site is included in Appendix B, Figure 2. Geologic logs, including well completion diagrams for all Ecova wells are included in Appendix F.

A well cluster of three wells (Well J1, J2, J3) was installed immediately downgradient from the former PCP mixing area. Well J1 was completed in the shallow water-bearing zone; Well J2 was completed just below the silty "confining" layer; and Well J3 was completed in the lower water-bearing zone.

A second well cluster, consisting of two wells (Wells B1, B2) was installed to replace Well B. Well B1 was completed in the shallow zone; Well B2 was completed in the deeper zone.

A single well (Well G1A) was installed to replace Well G. The shallow and deep zones appear to interfinger and do not exist as distinct units at this location.

The table below lists well depths, well diameters, and screen lengths for all six ECOVA well installations.

<u>Well #</u>	<u>Well Diameter</u>	<u>Well Depth</u>	<u>Screen</u>
J1	4"	20' 0"	10'
J2	4"	41' 11"	10'
J3	4"	35' 1"	5'
B1	4"	20' 6"	10'
B2	4"	41' 9"	10'
G1A	2"	35' 0"	10'

The shallow wells were drilled using the hollow stem auger method. At the completion depth, PVC flush joint, threaded casing and screen were installed through the auger stem. The screens were machine-slotted



(.020"), and the annular space filled with a graded filter sand; the remaining annular space above the screen was sealed with bentonite and grouted to surface. All wells are of 4-inch diameter, with the exception of Well G1A, which is of 2-inch diameter.

For the deeper wells, 10-inch surface casings were installed to the top of the aquitard and grouted in place in 14-inch holes drilled using the hollow stem auger method. After allowing the grout to set up, the borings were advanced to final depth using mud rotary and cable tool drilling methods. The 4-inch wells were installed to final depth as the temporary drive casing was withdrawn. This construction sequence ensured that no contaminants from the shallow zone would be carried down into the deeper layers.

All wells were developed using a surge block technique. Well casing elevations were surveyed relative to MSL and water levels were obtained. Three to five casing volumes of water were evacuated from the well bore prior to sampling.

#### **B PROPOSED ANALYTICAL PARAMETERS**

Groundwater samples were analyzed by EPA-approved Method 8270. This method is a stringent analytical procedure, and satisfies the level of quality required for samples from this site. The most recent sampling event occurred on March 13, 1991. The results of analyses of the water samples for PCP are reported below (the detection limit is 1 mg/kg):

<u>Well #</u>	<u>PCP (parts per million)</u>
K	ND
I	ND
H	ND
L	ND
J1	60
J2	1
J3	ND
B1	ND
B2	1
M	4
G	1





## C HYDROGEOLOGIC CHARACTERIZATION

On August 20, 1987, and again on October 16, 1987, water levels were obtained from the site wells. These measurements confirmed that groundwater was flowing south under an average gradient of 0.008 ft/ft.

An aquifer pumping test was conducted at the site in July 1989 to define aquifer parameters. Well J1 was pumped for 24 hours at an average rate of 19 gallons per minute. Drawdown was monitored continuously in the pumped well and in Wells B1 and 1 (see Appendix B, Figure 2) using a pressure transducer system. Periodic measurements were made in other selected site wells (J2, J3, B2, G1, and D) using an electrical water level sounder. No significant drawdown was measured in any of the observation wells.

Following the pumping phase of the test, recovery to static conditions was monitored in the pumped well. This information was used to calculate aquifer parameters. Calculated values are shown below:

Transmissivity:	8,360 gpd/ft
Permeability:	1,114 gpd/(ft*ft)



## V & VI. SURFACE WATER & AIR

Surface water and air contamination are not considered a significant problem, assuming safe operating and work habits, as the contaminated soil has been placed in a lined, bermed, storage area and covered with a tarp.



## **VII. SAMPLING AND ANALYSIS PLAN (SAP)**

The Sampling and Analysis Plan provides documentation for sampling and analytical procedures, data quality requirements, and data assessment performed by ECOVA in the past. The guidelines may be applied to any future sampling/analytical events.

### **A SAMPLE LOCATIONS**

Prior to excavation and stock piling of contaminated soil, ECOVA sampled the area in locations described in PAIII, Part I, Section B (Summary of Sampling Information). The location of future soil samples and sampling frequency are presently undetermined, and remain dependent upon the specific soil treatment option undertaken.

In addition, PCP-contaminated soil remains unexcavated in areas below the warehouse and adjacent to Tank 38009 (see Appendix B, Figure 1). The soil was not excavated, as it provides structural support for the warehouse building and tank. The future status of this soil has not yet been determined and will be further discussed in Part IV; current cleanup efforts primarily focus on the stockpiled soil.

Groundwater samples in the past have been collected from the existing groundwater monitoring wells at the site. In the future, the groundwater will continue to be sampled at regular intervals to monitor contamination levels. Current cleanup efforts have focused on contaminated soil. Later phases will address groundwater, if necessary.

### **B SAMPLE COLLECTION PROCEDURES**

Soil sampling in the excavation area was accomplished through common surface sampling techniques. Surface samples were collected with a hand auger. Deeper samples required some backhoe excavation prior to sampling. Samples were transferred to the appropriate containers quickly to maintain sample integrity.

Water sampling was performed following purging of three to five casing volumes of water from each well. Teflon bailers were used as the sample collection device. The bailer was slowly lowered on a nylon line to about the midpoint of standing water, then slowly hauled to the surface. The slow movement of the



bailer was necessary to avoid disturbances that can cause aeration or pressure variations in the water. At the well head, the water was transferred from the bailer to the appropriate sample containers.

Following the completion of all soil and water sampling activities at each location, all sampling equipment was thoroughly decontaminated according to the procedures and considerations described below. Bailer cord was disposed of after each round of sampling and new cord was used for each subsequent well.

**Decontamination Procedures:**

1. Disassemble equipment to maximum practical extent. Brush off any clinging soil material.
2. Wash items in a solution of Aleonox detergent and tap water.
3. Rinse in tap water.
4. Rinse in distilled or deionized water.
5. Let dry in air.

The use of this method greatly reduces the likelihood of any possible cross-contamination.

**C SAMPLE HANDLING REQUIREMENTS**

Water samples were collected using amber glass containers (with teflon-lined caps) of at least one liter in volume. Soil samples were collected using glass containers (with teflon caps) of at least 8 ounces. All samples were preserved at 4 degrees Celsius.

Samples were then sealed in coolers and accompanied by a chain-of-custody form and request-for-analysis form (see Appendix J for sample forms, labels and custody seals). The samples were hand-delivered or express-mailed to the analytical laboratory.

**D ANALYTICAL METHODS**

Samples were analyzed for PCP using EPA Method 8270 by GC/MS, as defined in Test Methods for Evaluating Solid Waste, SW-846.



#### **E,F,G DATA QUALITY**

A Quality Control Summary - Semivolatile Data Package has been provided by the analytical laboratory (PNEI) and is included in Appendix J. The ten-step quality control approach insures a high level of accuracy in sample data.





## VIII. HEALTH AND SAFETY PLAN

ECOVA established a Health and Safety Plan (HASP) for all employees engaged in field activities at the Time Oil Co. property in Portland, Oregon. A copy of ECOVA's original Health and Safety Plan is attached in Appendix H.

This site specific plan assesses site hazards, and discusses site health and safety training issues, personal protective equipment requirements, a medical surveillance program, decontamination procedures and other site controls, emergency response plans, and an environmental monitoring plan.



## IX. MAPS

A site map of the subject property is located in Appendix B, Figure 5. It indicates the area of soil excavation, and the location of the stock piled soil which is currently being considered for cleanup action.



**PAIV - DATA EVALUATION REPORT**



## I. BACKGROUND AND OBJECTIVES

The purpose of the Data Evaluation Report in this document, and in fact, the purpose of this entire submittal, is to determine, with support from proper authorities, a cleanup level for PCP at the Time Oil Co. - Portland Terminal site.

Much of the contaminated soil containing PCP and associated solvents has been excavated, and there is little room to stock pile additional soil, if necessary. Some PCP-contaminated soil was left in place, as its removal may have destabilized nearby structures. It is assumed that this unexcavated soil also contains solvents.

Time Oil Co.'s primary interest, as it has been since the PCP-contaminated soil was discovered in 1984, is to remediate the site. Time Oil Co. would like to establish an achievable and appropriate cleanup level which reflects the safety and health conditions at the site so that soil processing can begin. If further sampling and analysis is deemed necessary, it can be performed after processing of the stockpiled soil has begun.

The following discussion proposes potential soil cleanup levels for the Time Oil Co. site. Site location, potential for contaminant migration, and remediation feasibility are among the considerations essential to establishing an appropriate cleanup level.



## II. SOILS

Time Oil Co. would like to work with ODEQ to establish a cleanup criteria for soil at this site which is safe to health and the environment, that is based on the characteristics that exist at the site and that is consistent with cleanup levels established at other similar sites.

The Time Oil Co. Northwest Terminal has restricted access, 24 hour a day security and is completely surrounded by low population density industrial areas.

PCP is a non volatile compound with very low solubility in water. It is our understanding that a health-based cleanup level for PCP as established by Oregon's Department of Environmental Quality in soils is currently 2000 mg/kg.

There has been a precedent set at other Oregon and national sites to treat or remove PCP contaminated soils to less than 500 mg/kg. In a similar situation concerning Cascade Wood Products, a cleanup level was authorized which seemed technically achievable and environmentally safe. They were required to excavate and dispose of all soil with greater than 500 mg/kg PCP (prior to the restriction on land disposal of PCP) and consolidate and cap soil between 20 mg/kg and 500 mg/kg.

Based on full scale treatment tests at the site, it has been demonstrated that PCP can be biodegraded to at least as low as 500 mg/kg. Time Oil Co. therefore proposes that the soil stockpile at the Northwest Terminal site be treated to a level no greater than 500 mg/kg and that the residual soil then be left on site. Soil washing in conjunction with a biological process will be utilized to achieve that cleanup level.



### III. GROUNDWATER

Groundwater sampling has indicated no widespread contamination. However, there does appear to be some consistent contamination of groundwater immediately downgradient of the contaminated area. Therefore, quarterly groundwater monitoring is proposed for one year following treatment.



#### IV & V. SURFACE WATER AND AIR

As mentioned in Part III, surface water and air contamination does not appear at this time to be a significant problem, assuming reasonable safety precautions are taken. Currently the contaminated soil has been placed in a lined, bermed, storage area and covered with a tarp.



## VI. SUMMARY AND RECOMMENDATIONS

Time Oil Co. has identified and excavated approximately 3000 yards of PCP-contaminated soil. This soil has been stored in a bermed, lined, and covered area awaiting processing. While portions of the soil had contained high concentrations of PCP, the process of excavation and stock piling has blended the soil to an average concentration in the range of 950 mg/kg.

Concerted efforts were made to excavate all soils with PCP contamination, yet some contaminated soil remains. Some of this soil lies beneath the PCP Warehouse. Removal of this soil would require demolition of the warehouse. However, this soil is effectively capped and should be safe from leaching by surface waters. Other soil of a lesser degree of contamination was left in situ near Tank 38009. This low volume of soil remains unexcavated for fear of causing structural damage to the tank.

There does appear to be evidence of groundwater contamination at the site; it is limited to low concentrations in wells directly down gradient from the contaminated site.

Time Oil Co. recommends the following:

- The excavated soil should be treated to 500 mg/kg PCP concentration.
- Soil cleanup should be performed through biological remediation methods.
- The soil should be left on site after remediation.
- Groundwater should be monitored on a quarterly basis for one year.





**PRELIMINARY ASSESSMENT / DATA EVALUATION  
AND PROPOSED REMEDIATION PLAN  
FOR PENTACHLOROPHENOL CONTAMINATED SOIL AT:**

**TIME OIL CO.**

**NORTHWEST TERMINAL  
12005 NORTH BURGARD ROAD  
PORTLAND, OREGON**

**VOLUME II - APPENDICES**

**ECOVA Corporation  
18640 NE 67th Court  
Redmond, WA 98052**

**Project No. 1067**

**December, 1991**

**ECOVA**



## TABLE OF CONTENTS FOR APPENDIX A

- A "Northwest Terminal Woodtreating Chronology of Events"
- A-1 Department of Environmental Quality "Request for Analysis" for samples taken, December 12, 1984.
- A-2 Letter from John L. Smits (ODEQ) to Debbie Flood (EPA Region X) describing site conditions, February 12, 1985.
- A-3 Letter from ODEQ (Richard F. Gates) to Time Oil Co. giving 600 mg/kg as the hazardous waste threshold, June 28, 1985.
- A-4 Results of sample analysis for North West Vacuum Truck Service, February 19, 1985. Documentation for excavation of 240 tons of contaminated soil by Chem-Security systems, July 29, 1985.
- A-5 Letter from Riedel Environmental Services. Inc. to Time Oil Co. giving sample results, August 15, 1985. Report to Time Oil Co. from Riedel Environmental Services, October 18, 1985.
- A-6 Letter from George C. Hofer (EPA - RCRA Permits Section) to Time Oil Co. giving notice that PCP will no longer be accepted at hazardous waste facilities, December 10, 1985.
- A-7 Report to Time Oil Co. from Riedel Environmental Services, February 4, 1986.
- A-8 Time Oil Co. internal memo from Fred Proby on groundwater investigation, May 2, 1986.
- A-9 Report to Time Oil Co. from Century Environment Sciences, June 4, 1986.
- A-10 Report to Time Oil Co. from SRH Associates, Inc., October 1, 1986.
- A-11 Report to Time Oil Co. from SRH Associates, Inc., November 5, 1987.

NORTHWEST TERMINAL WOODTREATING  
CHRONOLOGY OF EVENTS

1981

Jan 28 Notice given to Koppers terminating 3/1/67 agreement effective March 31, 1982.

1983

April 18 Bioassay results show soil sample is toxic.

Oct. 5 Meeting with Koppers at terminal to formulate tank and soil removal agreement.

Nov. 15 Koppers removed all penta product and raw material from terminal.

1984

April 27 DEQ advised that terminal was to be inspected as part of DEQ/EPA "hit list" of 44 companies.

June 28 DEQ denied 5/24/84 TOC request to be deleted from inspection list.

Oct. 25 DEQ inspection and determination to collect samples.

Nov. 7 Information on terminal provided per DEQ request.

Dec. 12 DEQ collected 12 soil samples throughout tank farm, of which one was in penta area.

1985

Jan. 11 Status meeting with Koppers in St. Louis.

Jan. 24 Received results of DEQ soil sampling, showing 1820 ppm penta in woodtreating area.

Feb. 4 Status update letter to DEQ (Janet Gillaspie).

Feb. 19 Contract executed with Northwest Vacuum Truck Service, Inc. for removal of soil and transport to Arlington.

May 14 DEQ approved "Disposal Request" for penta contaminated soil at Arlington.

June 24 "Waste Transportation and Disposal Agreement" executed with Chem-Security Systems, Inc. for disposal of soil at Arlington.

June 25-28 242.76 tons (7781 cubic feet, 288 cubic yards) of soil removed to Arlington.

June 28 Contract executed with Riedel for penta sampling and analysis.

June 28 Received DEQ interpretation of maximum allowable penta concentration in soil (600 ppm) and water (0.15 ppm).

July 17 Received composite sample results showing maximum of 860 ppm penta.

Aug. 15 Received individual sample results and contour maps from Riedel showing maximum of 26,550 ppm penta (on ground surface where trucks were loaded).

Nov. 5 Amendment 2 to Riedel contract calling for decontamination of wall and installation of groundwater monitoring wells.

Dec. 13 Received letter from EPA advising that there were no commercial facilities that would accept penta.

# 1986

Jan. 8 Northwest vacuum truck contract cancelled.

Feb. 12 Received Riedel report on well installation and soil sampling showing maximum penta concentration of 116,000 ppm beneath warehouse.

Feb. 26 Received sample analysis results from ATW/Cadweld.

Feb. 28 TOC installed 3 well points (A,B,C) to measure water table gradient.

March 6 Submitted invoice to Koppers for their share of clean up costs.

April 1 TOC completed installation of 3 additional well points (E,F,G). Water level measurements indicated drainage through Riedel Well #4.

April ? Century Environmental Services collected water samples from wells B,E,F, and 4.

May 8 Riedel completed installation of 3 monitoring wells (D,H,I).

May 9 TOC collected water sample from well #4.

May 14 Riedel completed removal and sealing of well #4.

May ? Century collected water samples from wells A,B,D,E,F,H and I.

June 4 Received results of April water samples showing maximum of 6.1 ppb of penta in well #4.

June 11 Paid \$3,500 fee to Oregon DEQ for June 1985 movement of soil to Arlington.

July 7 Received results of May water samples showing only well #1 having detectable concentration (0.0022 ppm) of penta.

Aug. 8 Letter to Koppers briefly summarizing action to date.

Aug. 14 Contract with SRH Assoc. to collect and analyse soil samples and evaluate clean-up alternatives.

Aug. 20 Consolidated shallow "hot spots" of penta contamination into one pile.

Oct. 1 Received report from SRH on project history, remedial alternatives and analysis results. "Soil Washing" recommended as clean-up approach. Bench scale studies suggested as first step in design of system.

# 1987

Jan. 6 Received SRH proposal for bench scale studies of soil washing technique.

Feb. 27 Inquiry into on-site incineration by Waste Tech Inc.: project would cost \$2 million and take more than one year to complete.

Mar. 25 Soil sample sent to Keystone Environmental Resources (per Koppers instructions) for analysis of treatment alternatives.

Apr. 1 Invoice for \$54,780.28 sent to Koppers to cover their share of expenditures to date.

Aug. 13 Koppers advised that Jim Campbell (Keystone Environmental Resources) and Billy Nolan assigned to replace Jay Stebbins on this project. Results of soil tests and payment of invoice not yet received.

Oct. 2 Koppers reminded of obligation not yet paid.

Nov. 5 Received SRH report on samples collected 8/20 and 10/16 showing penta contamination in Well B of 2300 ppm and 1000 ppm, respectively. Highest levels found in groundwater to date.

Nov. 9 Koppers reminded of obligation. Jim Campbell agreed to provide soil test results and payment of April invoice. Campbell advised Koppers wishes to buy out of future liability.

Dec. 17 Received SRH proposal for treatment by excavation and soil washing. Treatment technique to be developed by bench scale tests.

1988

- Feb. 2 Received SRH proposal for excavation and temporary stockpile of soil while treatment approach is being developed.
- June 14 Revised SRH proposal and cost estimate for development of soil washing techniques.
- July 21 Requested cleanup proposal from Ecova Corp.
- Sept. 12 Received Ecova Work Plan for soil and groundwater remediation using biological treatment in above-ground reactors. Three alternative treatment levels - 500 ppm, 100 ppm & 50 ppm - were evaluated.
- Sept 19-22 Contacted Oregon DEQ (Ed Woods and Tom Miller) to determine DEQ's role. Was advised that DEQ does not necessarily need to approve the treatment process, but does need to sign-off that the cleanup was effectively completed.
- Oct. 12 Amended Ecova Work Plan to achieve final cleanup level of 0.5 ppm pentachlorophenol.
- Oct. 18 Amended Ecova Work Plan to include installation of additional monitoring wells.
- Nov. 9 Signed contract with Ecova. Cost for cleanup of penta in soil and water to 0.5 ppm is fixed at \$445,000 for 3,440 cubic yards of soil. Excavation and treatment of additional volumes of soil will cost \$90 per cubic yard.
- Dec. 2 Received notification from DEQ (letter dated 11/30/88) that facility was listed on "Inventory of Confirmed Releases" (site identification number 170).
- Dec. 5 Ecova commenced site mobilization.

1989

- Jan. 13 Received \$59,185.55 from Koppers for their share of investigation and cleanup costs through September 19, 1988.

LEG. L

DEPARTMENT OF ENVIRONMENTAL QUALITY  
Request for AnalysisLaboratory No. 84-1020Location/Site: Tine OilDate: 12 Dec 84Date Received Lab: DEC 13 1984 1243Collected By: RFG, JLSProgram: 4290Date Reported: JAN 15 1985Purpose: RCRA Site SurveyReport Data To: Water, SmithComments: Samples packed in Refrigerator #1208 overnight and removed for log-in 13 Dec 84 lab prepare\* Basic (P) unpreserved; Nutrient (R) add H<sub>2</sub>SO<sub>4</sub> in field; Metals (Tm) HNO<sub>3</sub> added in lab--don't rinse; Organic(X) mason jar

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s				Test Required
		Nutrients	DO	Metals		
		Basic	BOD	Organic		
1	Composite soil core (surface + 1' + 2' + 3') See map for location				Z1020	EP Lead GC/MS - Acids, BW PCB's
2	"				Z1007	"
3	"				Z1019	"
4	"				Z1008	"
5	"				Z1009	"
6	"				Z1010	"

Laboratory comments \_\_\_\_\_

# LEG L

## DEPARTMENT OF ENVIRONMENTAL QUALITY Request for Analysis

Laboratory No. 4-1020

Location/Site: Time Oil

Date: 12 Dec 84

Date Received Lab: DEC 13 1984 1245

Collected By: RF6, JLS

Program: 4290

Date Reported: JAN 15 1985

Purpose: \_\_\_\_\_

Report Data To: \_\_\_\_\_

Comments: \_\_\_\_\_

Basic (P) unpreserved; Nutrient (R) add H<sub>2</sub>SO<sub>4</sub> in field; Metals (Tm) HNO<sub>3</sub> added in lab--dcn't rinse; Organic(X) mason jar lab prepared

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s				Test Required
		Nutrients Basic	DO BOD	Metals Organic		
7	"				Z1011	EP tox Pb " GCMS acid/BN PCB's
8	"				Z1012	"
9	"				Z1018	"
10	"				Z1017	"
11	"				Z1016	"
12	"				Z1004	"

Laboratory comments \_\_\_\_\_





DATE: 31 DEC 84

# LEGAL

2/49

LAB #: 84-1028

ITEM #: 1

SAMPLE: 21028

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHTHENE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

3/49

DATE: 31 DEC 84

LAB #: 48-1020

ITEM #: 1

SAMPLE: Z1020

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

\*\*\*\*\*

AMOUNT	PARAMETER
MG/KG	

\*\*\*\*\*

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

4/49

8/11

31 DEC 84

GC/MS SCAN ID

84-1020 71020

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 02 JAN 84

LAB #: 84-1029

ITEM #: 2

SAMPLE: 21007

LEGAL

5/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORENE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

DATE: 02 JAN 95 *dh*

# LEGAL

6/49

LAB #: 84-1020

ITEM #: 2

SAMPLE: 21007

PESTICIDES

METHOD 625

EXTRACTED BY RCRA 3540

\*\*\*\*\*  
AMOUNT      PARAMETER  
NG/KG  
\*\*\*\*\*

<S    ALPHA-BHC  
<S    HEPTACHLOR  
<S    ALDRIN  
<S    HEPTACHLOR EPOXIDE  
<S    ENDOSULFAM I  
<S    TRANS-NONACHLOR  
<S    P,P'-DDE  
<S    DIELDRIN  
<S    ENDRIN  
<S    ENDOSULFAM II  
<S    P,P'-DDD  
<S    ENDOSULFAM CYCLIC SULFATE  
<S    P,P'-DDT  
<S    GAMMA-BHC (LINDANE)

DM  
**LEGAL**

7/49

02 JAN 85

GC/MS SCAN ID

84-1020 21007

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 28 DEC 84

# LEGAL

8/49

LAB #: 84-1833

ITEM #: 3

SAMPLE: 21819

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **
			** REPORTED AS 2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE



# LEGAL

9/49

DATE: 28 DEC 84

LAB #: 84-1833

ITEM #: 3

SAMPLE: Z1019

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<S	ALPHA-BHC
<S	HEPTACHLOR
<S	ALDRIN
<S	HEPTACHLOR EPOXIDE
<S	ENDOSULFAM I
<S	TRANS-NONACHLOR
<S	P,P'-DDE
<S	DIELDRIN
<S	ENDRIN
<S	ENDOSULFAM II
<S	P,P'-DDD
<S	ENDOSULFAM CYCLIC SULFATE
<S	P,P'-DDT
<S	GAMMA-BHC (LINDANE)

# LEGAL

10/49

2/11

28 DEC 84

GC/MS SCAN ID

84-1020 21019

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

# LEGAL

11/49

DATE: 31 DEC 84

*DM*

LAD #: 84-1020

ITEM #: 4

SAMPLE: 21008

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT NG/KG	PARAMETER	AMOUNT NG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT NG/KG	PARAMETER	AMOUNT NG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	3	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	2	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
1	ISOPHORONE	1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

*1 ppm  
trace only  
not significant  
not a problem*

# LEGAL

12/49

DATE: 31 DEC 84

DJH

LAB #: 84-1028

ITEM #: 4

SAMPLE: 21008

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3348

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

13149

DJH

31 DEC 84

GC/MS SCAN ID

84-1020 Z1008

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
NONANE	1
DECANE	4
4-METHYLDECANE	3
UNDECANE	19
2-METHYLUNDECANE	8
DODECANE	46
TRIDECANE	67
7-METHYLTRIDECANE	38
HENEICOSANE	37

DATE: 28 DEC 84

LAB #: 84-1926

ITEM #: 5

SAMPLE: 21009

LEGAL

14/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY ACRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

15/49

DATE: 28 DEC 84

SM

LAB #: 84-1833

ITEM #: 5

SAMPLE: Z1809

PESTICIDES

METHOD 625.

EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

16/49

27/1

28 DEC 84

GC/MS SCAN ID

84-1020 21009

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNNS ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWNNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.



# LEGAL

17/49

DATE: 28 DEC 84

DJH

LAB #: 84-1033

ITEM #: 6

SAMPLE: Z1010

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

18/49

DATE: 28 DEC 84

*SM*

LAB #: 84-1033

ITEM #: 6

SAMPLE: 21010

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

1a/49

DM

28 DEC 84

GC/MS SCAN ID

84-1020 71010

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

# LEGAL

DATE: 03 JAN 85

LAB #: 84-1028

ITEM #: 7

SAMPLE: Z1011

20/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

21/49

DATE: 03 JAN 85

DH

LAB #: 84-1020

ITEM #: 7

SAMPLE: Z1011

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
NG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

8/11  
**LEGAL**

2249

03 JAN 85

GC/MS SCAN ID

84-1020 21011

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 8

SAMPLE: Z1012

# LEGAL

23/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT NG/KG	PARAMETER	AMOUNT NG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT NG/KG	PARAMETER	AMOUNT NG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	13	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	14	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	105	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

24/49

DATE: 03 JAN 83

DH

LAB #: 84-1020

ITEM #: 8

SAMPLE: 21912

PESTICIDES  
METHOD 623  
EXTRACTED BY RCRA 3540

\*\*\*\*\*  
AMOUNT

PARAMETER

MG/KG  
\*\*\*\*\*

<5 ALPHA-BHC  
<5 HEPTACHLOR  
<5 ALDRIN  
<5 HEPTACHLOR EPOXIDE  
<5 ENDOSULFAN I  
<5 TRANS-NONACHLOR  
<5 P,P'-DDE  
<5 DIELDRIN  
<5 ENDRIN  
<5 ENDOSULFAN II  
<5 P,P'-DDD  
<5 ENDOSULFAN CYCLIC SULFATE  
<5 P,P'-DDT  
<5 GAMMA-BHC (LINDANE)



LEGAL

25/49

DH

03 JAN 85

GC/MS SCAN ID

84-1020 21012

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

# LEGAL

26/49

DATE: 03 JAN 85

LAB #: 94-1828

ITEM #: 9

SAMPLE: Z1818

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY ACRA METHOD 3548

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
515	PENTACHLOROPHENOL
12	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

*Because  
it is a very low level  
it is not significant  
to the results*

*a part of commercial  
data - that's why it's*

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
3	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

*very small  
amount  
not significant*

# LEGAL

27/49

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 9

SAMPLE: 21018

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

28/49

DH

03 JAN 85

GC/MS SCAN ID

84-1020 21018

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
DODECANE	6
TRIDECANE	8
PENTADECANE	6

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 10

SAMPLE: Z1017

LEGAL

29/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3340

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	1820	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	71	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

DATE: 03 JAN 85

LEGAL

30/49

LAB #: 84-1020

ITEM #: 10

SAMPLE: 21017

PESTICIDES

METHOD 625

EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
NG/KG	

=====

<3	ALPHA-BHC
<3	HEPTACHLOR
<3	ALDRIN
<3	HEPTACHLOR EPOXIDE
<3	ENDOSULFAN I
<3	TRANS-NONACHLOR
<3	P,P'-DDE
<3	DIELDRIN
<3	ENDRIN
<3	ENDOSULFAN II
<3	P,P'-DDD
<3	ENDOSULFAN CYCLIC SULFATE
<3	P,P'-DDT
<3	GAMMA-BHC (LINDANE)

LEGAL

31/49

DM

03 JAN 85

GC/MS SCAN ID

84-1020 Z1017

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
1-ETHYL-4-METHYLCYCLOHEXANE	10
2,6-DIMETHYLOCTANE	10
4-METHYLNONANE	8
1-METHYL-4-(1-METHYLETHYL)CYCLOHEXANE	12
4-METHYLDECANE	36
BUTYLCYCLOHEXANE	14
5-METHYLDECANE	15
3-METHYLDECANE	8
UNDECANE	18
OCTYLCYCLOPROPANE	53

THE SAMPLE ALSO CONTAINED NUMEROUS OTHER COMPOUNDS NOT IDENTIFIED. THE PATTERN, HOWEVER, WAS INDICATIVE OF A SOLVENT MIXTURE SIMILAR TO PAINT THINNER.

DATE: 02 JAN 85

LAB #: 84-1020

ITEM #: 11

SAMPLE: Z1016

LEGAL

32/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE



DATE: 02 JAN 83

LAB #: 84-1028

ITEM #: 11

SAMPLE: Z1016

**LEGAL**

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

\*\*\*\*\*  
AMOUNT      PARAMETER  
MG/KG  
\*\*\*\*\*

<5    ALPHA-BHC  
<5    HEPTACHLOR  
<5    ALDRIN  
<5    HEPTACHLOR EPOXIDE  
<5    ENDOSULFAN I  
<5    TRANS-NONACHLOR  
<5    P,P'-DDE  
<5    DIELDRIN  
<5    ENDRIN  
<5    ENDOSULFAN II  
<5    P,P'-DDD  
<5    ENDOSULFAN CYCLIC SULFATE  
<5    P,P'-DDT  
<5    GAMMA-BHC (LINDANE)

**LEGAL**

34/39

dyh

02 JAN 85

GC/MS SCAN ID

84-1020 Z1016

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 02 JAN 83

LAB #: 84-1020

ITEM #: 12

SAMPLE: 21004

# LEGAL

35/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

DATE: 02 JAN 85

LAB #: 84-1029

ITEM #: 12

SAMPLE: Z1004

36/49

PESTICIDES

METHOD 625

EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

37/49

8/1

02 JAN 85

GC/MS SCAN ID

84-1020 21004

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 1

SAMPLE: 21020

# LEGAL

38/49

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
NG/KG	

=====

<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

39/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 2

SAMPLE: 21007

*BK*

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
NG/KG	

=====

<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

40/39

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 3

SAMPLE: Z1019

Q2K

## PCB'S METHOD 608

\*\*\*\*\*  
AMOUNT      PARAMETER  
MG/KG  
\*\*\*\*\*

<0.5    PCB GROUP 1  
<0.1    PCB GROUP 2  
<0.05   PCB GROUP 3  
<0.05   PCB GROUP 4  
<0.05   PCB GROUP 5  
0        TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.



# LEGAL

41/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 4

SAMPLE: Z1008

## PCB'S METHOD 608

\*\*\*\*\*  
AMOUNT      PARAMETER  
NG/KG  
\*\*\*\*\*

<0.25    PCB GROUP 1  
<0.1     PCB GROUP 2  
<0.05    PCB GROUP 3  
<0.05    PCB GROUP 4  
<0.05    PCB GROUP 5  
0        TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

42/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 5

SAMPLE: Z1999

*pk*

## PCB'S METHOD 600

=====

AMOUNT	PARAMETER
NG/KG	

=====

<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

43/49

DATE: 14 JAN 85

LAB #: 84-1028

ITEM #: 6

SAMPLE: 21010

*pk*

PCB'S  
METHOD 608

\*\*\*\*\*  
AMOUNT      PARAMETER  
NG/KG  
\*\*\*\*\*

<0.25    PCB GROUP 1  
<0.1    PCB GROUP 2  
.09    PCB GROUP 3  
<0.05    PCB GROUP 4  
<0.05    PCB GROUP 5  
.09    TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

44/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 7

SAMPLE: Z1011

DEK

## PCB'S METHOD 608

*****	
AMOUNT	PARAMETER
NG/KG	
*****	
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

45/49

DATE: 14 JAN 85

LAB #: 84-1828

ITEM #: 8

SAMPLE: 21012

OK

PCB'S  
METHOD 600

=====

AMOUNT	PARAMETER
NG/KG	

=====

<0.75	PCB GROUP 1
<0.25	PCB GROUP 2
<0.15	PCB GROUP 3
<0.15	PCB GROUP 4
<0.15	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

46/49

DATE: 14 JAN 85

LAB #: 84-1920

ITEM #: 9

SAMPLE: Z1018

*OK*

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
NG/KG	

=====

<10	PCB GROUP 1
<10	PCB GROUP 2
<5	PCB GROUP 3
<5	PCB GROUP 4
<5	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

47/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 10

SAMPLE: Z1017

*REK*

PCB'S  
METHOD 600

\*\*\*\*\*  
AMOUNT      PARAMETER  
MG/KG  
\*\*\*\*\*

<100    PCB GROUP 1  
<100    PCB GROUP 2  
<50    PCB GROUP 3  
<50    PCB GROUP 4  
<50    PCB GROUP 5  
0    TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

48/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 11

SAMPLE: 21016

PK

PCB'S  
METHOD 608

=====	
AMOUNT	PARAMETER
NG/KG	
=====	
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.



# LEGAL

49/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 12

SAMPLE: 21004

*pk*

PCB'S  
METHOD 600

*****	
AMOUNT	PARAMETER
MG/KG	
*****	
<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1216, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

STATE OF OREGONDEPARTMENT OF ENVIRONMENTAL QUALITYINTEROFFICE MEMO

TO: Debbie Flood, Superfund Program  
Management Section, EPA-Region X

DATE: February 12, 1985

FROM: John L. Smits  
Northwest Region, DEQ

SUBJECT: HW - 3012 Superfund  
Time Oil Company  
ORD 009597543  
Multnomah County

Time Oil Company operates a petroleum products storage terminal at 12005 N. Burgard, Portland, Oregon 97203. The terminal occupies a 51.53-acre site along the east bank of the Willamette River and is owned by Time Oil Co., PO Box 24447 Terminal Annex, Seattle, Washington 98124. The present capacity of the terminal in 30+ tanks is 770,000 barrels.

The on-site inspection was conducted on Oct. 25, 1984. John Denham, environmental manager who has worked for Time Oil since 1970 and Neil Wallis, terminal manager employed by Time Oil since 1979 were interviewed. Time Oil Co. acquired the site during 1959. Mr. Denham provided by letter dated Nov. 7, 1984, the attached chart which lists the tanks by number and indicates the types of chemicals stored in each since 1973. As can be seen from the chart, most tanks have held a number of different chemicals at different times. For example, tank no. 4408 held the following during the period:

1973	Methanol
1974	Jet fuel
1975	Premium gasoline
1976-78	Unleaded gasoline
1979-80	Fuel oil no. 2
1981-83	Empty

The terminal has handled the following chemicals:

Fatty acid (wood byproduct)	Liquid fertilizer (ammonium nitrate)
Isobutanol	Lignin liquor
Jet fuel	Lube oil
Methanol	Methyl 10
Premium gasoline	Pentachlorophenol
Regular gasoline	Solvent (xylene, toluene)
Turpentine	Unleaded gasoline
Butyl alcohol	

A number of the substances that have been and are stored at this Time Oil terminal are hazardous substances due to ignitability or toxicity.

It appears that several arrangements have been made at the terminal related to product handling. Time Oil may lease a tank to a company like Chevron with the stored product owned by Chevron and handling, distribution and storage services performed by Time Oil. Time may control the tank, own the product and distribute the product, or rent a tank for storage only.

In the case of tanks 50067 and 10002, Time Oil Co. leased the tanks and possibly that portion of the tank farm site to Crosby and Overton of 5420 N. Lagoon, Portland, Oregon 97217. The same tanks appear to have been leased prior to this time by Pac-Mar, the previous name of Crosby and Overton. The Department has been unable to obtain a copy of the lease agreement. Crosby and Overton provides the service of collecting and then storing waste oils from separators, oil slop tanks, ship tank cleaning, etc. The two tanks appear to have been leased to Crosby and Overton since 1973.

Several smaller tanks, no. 20001, 20002 and 20003 having a capacity of 20,000 gal. each were leased to Koppers Co., Inc., of 5137 Southwest Ave., St. Louis, MO 63110. Several smaller, above-ground, horizontal oriented tanks in this area belong to Koppers Co. as well. According to Mr. Denham, Time Oil Co. formulated pentachlorophenol for Koppers to Koppers specifications and then handled or stored the formulations for later pickup by customers of Koppers.

The 20,000-gal. tanks were present during the Oct. 25, 1984 site inspection (reportedly empty) but had been removed from the site prior to the Dec. 12, 1984 soil sampling event. There was visually obvious contamination of the soil by incidental spills and slops in this former pentachlorophenol handling area. The level of contamination will be discussed later in this narrative.

#### Present Waste Management Practices

Since around December 1972, all tanks (except 50067 and 10002 leased to Crosby and Overton and the smaller tanks leased to or belonging to Koppers Company), the loading rack area and the pump house have been connected to a water draw system. A water draw box and water draw fittings are located beside each tank. These in turn are connected to a drainage piping network in place throughout the terminal. About once each year, water is drawn from the bottom of each tank and pumped to slop tank 3007 located in the northwest terminal area, or to tank 1406 in the area known as the Bell Oil Terminal. A portable Fram-Akers oil/water separator is periodically connected to the slop tank. The separated oil is either piped back to the appropriate storage tank or to an underground 3000-gal. separator tank near tank 3007 or an above-ground separator tank no. 1407 beside tank 1506. Water removed by the separator which contains less than 100 ppm ether soluble oil is by agreement discharged by a piping system to the City of Portland sanitary sewer system for treatment at the publicly owned treatment works (POTW). Two sampling manholes associated with two sewer lines are periodically monitored by staff with the City Dept. of Public Works. Waste oil from the separator is periodically removed from the underground 3000-gal. tank and above-ground tank 1507, and taken by Crosby and Overton to the tanks 50067 or 10002 that they lease from Time Oil on

the same site area. Alternately, a vacuum truck may be connected directly to the oil/water separator with waste oils transported to the Crosby and Overton tanks.

There is also an underground 6000-gal. spill prevention control and countermeasure (SPCC) tank associated with the off-shore pier to hold any spills and storm water that may be collected during ship loading/unloading. An 8000-gal. underground SPCC tank is located near the pump house and truck loading rack to collect any spills and storm water from those areas. The rail spur line recently constructed with curbing and spill drains has an underground 12,000-gal. tank for containment of any spills in that area. The loading rack area of the Bell Oil Terminal section was proposed to be equipped with an underground 4000-gal. slop and water tank. This section of the terminal has not been in use for quite some time.

Time Oil Co. on Aug. 11, 1980, completed EPA Form 8700-12, Notification of Hazardous Waste Activity, as required by RCRA 3010 listing specific source wastes, K051 - API separator sludge, K052 - tank bottoms (leaded) and P090 - pentachlorophenol. On Feb. 22, 1982, Time Oil requested assignment of a generator identification number by correspondence with the Department of Environmental Quality.

#### Past Waste Management Practices

According to Mr. Denham, there are no retrievable inventory records of product storage for the period 1959 to 1973. He agreed that it can be assumed similar products were stored on-site in a pattern like that shown on the 1973 to 1983 chart provided by Time Oil Co.

Prior to the installation of the draw water system for each tank, associated piping and use of the portable oil/water separator in late 1972, wastewater from tank bottoms was allowed to spill onto the ground around the site. This practice was apparently common to oil terminal facilities in the area until Oregon DEQ began to work in 1970-71 with terminals to discontinue discharge into public waters and onto ground surfaces. This practice apparently occurred at the Time Oil terminal during the period from 1959 to late 1972. A Feb. 16, 1971 internal memo describes a conversation with the plant engineer employed by Time Oil at that time that confirms the discharge of draw water from tank bottoms onto the ground but states further that the company maintained no such effluent discharged to the river, drainage ditch or storm sewer.

In view of the wasting of water from tank bottoms onto the soil surface for a period of up to 13 years, and the storage of leaded gasoline at one time or another in most of the tanks, a decision was made to collect soil samples in a somewhat random grid fashion throughout the terminal area. Samples were also collected in the area near tanks used by Crosby and Overton and those leased to Koppers to store pentachlorophenol formulations.

### Sampling

At each of 12 locations, a composite soil sample using a soil core was collected. The composite was made up of the surface and 1, 2 and 3 foot intervals. Samples were collected and analyzed by the DEQ laboratory. Analysis of each sample included base-neutral extractables, pesticides/PCBs (method 608), acid extractables, pesticides (method 625) and EP Toxicity for lead. An effort was also made to identify and quantify any other organic chemical observed with the extraction/GC (gas chromatograph) MS (mass spectrometer) procedures.

All 12 soil samples tested for EP Toxicity lead showed concentrations of <0.1 mg/l. Concentrations of 5 mg/l or greater for EPA Toxic lead are classified as hazardous waste. The detection limit for this procedure is 0.1 mg/l.

Of 12 soil samples tested for pesticides, method 625, extracted by RCRA method 3540, all showed concentrations of <5 mg/kg (the detection limit) of these pesticides.

Samples tested for acid extractables method 625, extracted by RCRA method 3540 (acetone/hexane) showed all 12 sites to contain <1 mg/kg (detection limit) for these phenol species except item 9, sample Z1018 collected 19 ft. NE of tank 50067 (Crosby and Overton leased tank) contained 515 mg/kg pentachlorophenol and 12 mg/kg tetrachlorophenol. Item 10, sample Z1017 contained 1820 mg/kg pentachlorophenol and 71 mg/kg tetrachlorophenol collected at the site of the tanks leased to Koppers for storage of pentachlorophenol formulations.

Of the soil samples collected and analyzed for base-neutral extractables, method 625, extracted by RCRA method 3540 all showed concentrations of this group of pollutants to be less than the detection limit (< 1 mg/kg) except the following tanks showed:

No. 20511 - Item 4, soil bag Z1008

Isophorone	1 mg/kg
2,4-dinitrotoluene	3 mg/kg
Fluorene	1 mg/kg
n-nitrosodiphenylamine	2 mg/kg
Phenanthrene	1 mg/kg
Anthracene	1 mg/kg

No. 15002 - Item 8, soil bag Z1012

Fluorene	13 mg/kg
Phenanthrene	14 mg/kg
Anthracene	105 mg/kg

Crosby and Overton

No. 50067 - Item 9, soil bag Z1018

Chrysene	1 mg/kg
Bis(2-ethylhexyl)phthalate	3 mg/kg

Although polychlorinated biphenyls (PCBs) were detected at several soil sample sites, total PCBs were well below the 50 mg/kg concentration which requires handling.

At each sample site, in addition to the priority pollutant chemicals, the sample was scanned for any other unknowns above the detection limit of 1.0 mg/l. In the case of 3 sample sites, 4 (Z1008), 9 (Z1018) and 10 (Z1017), a number of other chemicals were tentatively identified and estimated concentrations determined. These results are shown on the attached lab sheets.

#### Crosby and Overton Leased Tanks

During 1983 on an as yet unspecified date, an individual was allegedly exposed to a substance while cutting an access hole into tank no. 10002 leased to Crosby and Overton by Time Oil Co. The hole was reportedly cut to remove the substance inside. Allegedly, the individual developed immediate symptoms involving skin irritation. Reportedly, the individual returned to the tank some time later and collected three (3) soil samples near the tank. Those soil samples were said analyzed by CH2M/Hill. CH2M/Hill reported PCB concentrations of 29.4 mg/kg, 584, mg/kg and 1060 mg/kg (disposal restrictions apply when PCB concentrations exceed 50 mg/kg).

On May 2, 1984, DEQ laboratory staff collected samples at the Crosby and Overton tank in question. A soil sample 10 ft. from the apparent access hole cut into the tank showed a total PCB concentration of 59.7 mg/kg. Sludge collected on a surface 4 ft. from the edge of the tank entry hole showed a total PCB concentration of 1357 mg/kg.

Detection of PCB near the tank resulted in review of past waste oil disposal records involving the Crosby and Overton tank. The records showed disposal of 210,000 gal. of petroleum-based sludge by Crosby and Overton at the St. Johns Municipal Landfill located on Columbia Blvd. in Portland, Oregon. An application for disposal of special wastes at the landfill was approved by the Metropolitan Service District (Metro) Aug. 10, 1983, following review of sample analysis of the tank contents which showed PCB concentrations to be <1 ppm.

During Sept. 1984, the area at the St. Johns Landfill believed to contain the 210,000 gal. of petroleum sludge was extensively sampled and analyzed for PCBs. The presence of PCBs in the areas tested was not confirmed.

#### Assessment

There are problems at the Time Oil Co. terminal associated with the past handling of hazardous substances. The long-time discharge of tank bottom draw water onto the ground surface within the terminal area may have impacted groundwater below the site. This could not be confirmed using the sampling equipment available. Surface soil samples did not detect any significant concentrations of priority pollutants to depths of three (3) feet that might be expected within a tank farm that had discharged wastewater onto the ground. As mentioned above under the Sampling section, priority pollutants and other organic chemicals were found in some areas.

The soil on-site appears to be dredge sand that has been in place for many years. Lenses of silt were observed within the 3-ft. sample. The silt appeared to perch water at some sample sites. The permanent groundwater table is apparently about 20 ft. below the land surface. Downgradient groundwater usage could not be confirmed.

Based on past practices of draw water disposal, presence of some contaminants within the upper surface and shallow depth of groundwater, it is recommended that construction of groundwater monitoring wells be seriously considered to better characterize the extent of pollution.

Pentachlorophenol is present in high concentrations within the soil in the area of the tanks leased to Koppers Co. and those leased to Crosby and Overton. These areas need cleanup of the spilled hazardous wastes. Cleanup should include careful evaluation of the effectiveness of the removal including groundwater sampling. Further review of the alleged incident involving presence of PCB at the Crosby and Overton tanks appears to be warranted.

During a Jan. 28, 1985, phone conversation with John Denham of Time Oil, the detection of pentachlorophenol was discussed. He told me the company realized the waste was present on the ground and soil some time ago. Denham also told me that after this information became available, Time had cancelled the contract to handle pentachlorophenol and its ingredients for Koppers as well as the lease of tanks. Denham stated that tanks have been cleaned out and removed and the remaining tanks will be moved out soon and cleanup of the area will start. It was suggested that this information be sent by letter to the Northwest Region of DEQ including proposed cleanup methods and time schedule. He said he would do that after reviewing sampling results.

#### Backlog Reduction

It is recommended that Time Oil Co. (ORD 009597543) be placed into backlog reduction category B-5. Problems involving hazardous wastes are present. The State of Oregon DEQ, Northwest Region, has the regulatory authority to investigate hazardous waste handling/disposal and to require remedial cleanup action. Northwest Region of DEQ fully intends to follow up this assessment and work with the company to establish necessary monitoring and cleanup.

The site does not appear to present a hazard to the health of the general public by direct contact with wastes present due to the security of fences, 24-hr/day staffing of the site and a watchman service. The threat to the environment appears to be related to the potential impact to groundwater. Groundwater impact needs to be further evaluated.

At this time, it does not appear that further involvement of the RCRA 3012 program will be necessary.

RC2044

Attachment

cc: Northwest Region, DEQ  
Hazardous Waste Operations, DEQ  
Time Oil Co.  
Crosby and Overton

# GENERATOR'S WASTE MATERIAL PROFILE SHEET

NWB E13588

## A. GENERAL INFORMATION

GENERATOR NAME Time Oil Co. TRANSPORTER Gresham Transfer Inc.  
 FACILITY ADDRESS 12005 N. Burgard Rd. TRANSPORTER PHONE (503) 255-7900  
Portland, OR GENERATOR USEPA ID. OR D100915975  
 GENERATOR STATE ID. \_\_\_\_\_  
 TECHNICAL CONTACT John P. Denham TITLE Environmental Manager PHONE (206) 285-2400  
 NAME OF WASTE PCP contaminated soil  
 HAZARDOUS WASTE Clean up of contaminated site at 12005 N. Burgard Road

## B. PHYSICAL CHARACTERISTICS OF WASTE

COLOR	<input type="checkbox"/> NONE <input checked="" type="checkbox"/> SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> POWDER	PHYSICAL STATE @ 70°F	<input checked="" type="checkbox"/> SOLID <input type="checkbox"/> SEMI-SOLID <input type="checkbox"/> LIQUID <input type="checkbox"/> POWDER	LAYERS	<input type="checkbox"/> MULTILAYERED <input type="checkbox"/> BI-LAYERED <input checked="" type="checkbox"/> SINGLE PHASED	FREE LIQUIDS	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
FLASH POINT	<input type="checkbox"/> < 70°F <input type="checkbox"/> 70°F - 100°F <input type="checkbox"/> 101°F - 139°F <input type="checkbox"/> 140°F - 200°F	SPECIFIC GRAVITY	<input type="checkbox"/> < 1 <input type="checkbox"/> 1.1 - 1.2 <input type="checkbox"/> 1.3 - 1.4 <input type="checkbox"/> 1.5 - 1.7 <input type="checkbox"/> > 1.7	FLASH POINT	<input type="checkbox"/> < 70°F <input type="checkbox"/> 70°F - 100°F <input type="checkbox"/> 101°F - 139°F <input type="checkbox"/> 140°F - 200°F	NO FLASH	<input checked="" type="checkbox"/> NO FLASH <input type="checkbox"/> EXACT _____

## C. CHEMICAL ANALYSIS (CONCENTRATIONS MUST ADD TO 100%)

Contaminated soil  
 pentachlorophenol .1820  
 tetrachlorophenol .0071  
 trace amounts of other  
 chlorinated chemicals less than .0001  
 Non-contaminated soil 99.812

D. METALS TOTAL (PPM) EPA EXTRACTION PROCEDURE (mg/L)  
 ARSENIC (As) -0- SELENIUM (Se) -0-  
 BARIUM (Ba) -0- SILVER (Ag) -0-  
 CADMIUM (Cd) -0- COPPER (Cu) -0-  
 CHROMIUM (Cr) -0- NICKEL (Ni) -0-  
 MERCURY (Hg) -0- ZINC (Zn) -0-  
 LEAD (Pb) -0- THALLIUM (Tl) -0-  
 CHROMIUM HEX (Cr + 6) -0-

E. OTHER COMPONENTS - TOTAL (PPM)  
 CYANIDES -0- PCB'S -0-  
 SULFIDES -0- PHENOLICS -0-

## F. SHIPPING INFORMATION

DOT HAZARDOUS MATERIAL? ☒ YES ☐ NO  
 PROPER SHIPPING NAME Waste pentachlorophenol mixture  
 HAZARD CLASS ORM-E ID NO NA 2020 NO 10 lbs  
 METHOD OF SHIPMENT: ☐ BULK LIQUID ☒ BULK SOLID  
☐ DRUM, TYPE SIZE \_\_\_\_\_  
 ANTICIPATED VOLUME \_\_\_\_\_ GALS 260 CUBIC YARDS  
 PER ☒ ONE TIME ☐ WEEK ☐ MONTH  
☐ QUARTER ☐ YEAR

## G. HAZARDOUS CHARACTERISTICS

REACTIVITY: ☒ NONE ☐ PYROPHORIC ☐ SHOCK SENSITIVE  
☐ EXPLOSIVE ☐ WATER REACTIVE ☐ OTHER \_\_\_\_\_  
 OTHER HAZARDOUS CHARACTERISTICS:  
☒ NONE ☐ RADIOACTIVE ☐ ETIOLOGICAL  
☐ PESTICIDE MANUFACTURING WASTE ☐ OTHER \_\_\_\_\_  
 USEPA HAZARDOUS WASTE? ☒ YES ☐ NO  
 USEPA HAZARDOUS CODE(S) U242  
 STATE HAZARDOUS WASTE? ☒ YES ☐ NO  
 STATE CODE(S) U 242

## H. SPECIAL HANDLING INFORMATION

I HEREBY CERTIFY THAT ALL INFORMATION SUBMITTED IN THIS AND ALL ATTACHED DOCUMENTS IS COMPLETE AND ACCURATE, AND THAT ALL KNOWN OR SUSPECTED HAZARDS HAVE BEEN DISCLOSED

AUTHORIZED SIGNATURE

TITLE

DATE

BZTO104(e)011588



# CERTIFICATION OF REPRESENTATIVE SAMPLE

GENERAL DIRECTIONS: IN ORDER TO DETERMINE WHETHER WE CAN ACCEPT THE SPECIAL WASTE DISCUSSED IN THE ABOVE NUMBERED PROFILE SHEET, WE MUST OBTAIN A REPRESENTATIVE SAMPLE OF THE WASTE. WE WILL ANALYZE THE SAMPLE TO VERIFY THE INFORMATION YOU HAVE PROVIDED US, SO IT IS PARTICULARLY IMPORTANT THAT THE SAMPLE BE TRULY REPRESENTATIVE. IN MOST CIRCUMSTANCES YOU WILL BE OBTAINING THE SAMPLE. HOWEVER, IN THOSE CASES IN WHICH WE OBTAIN THE SAMPLE, WE MUST ASK THAT ONE OF YOUR EMPLOYEES BE PRESENT TO DIRECT THE PARTICULAR SOURCE TO BE SAMPLED AND TO WITNESS THE SAMPLING. IN SUCH CASE, YOUR EMPLOYEE MUST SIGN THIS CERTIFICATION AS A WITNESS.

THIS CERTIFICATION MUST BE RETURNED, WITH THE REPRESENTATIVE WASTE SAMPLE, TO:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

THE UNDERSIGNED CERTIFIES THAT HE/SHE OBTAINED A REPRESENTATIVE SAMPLE OF THE WASTE MATERIAL DESCRIBED IN THE "GENERATOR'S WASTE MATERIAL PROFILE SHEET" ABOVE REFERENCED, AND THAT THE FOLLOWING REPRESENTATIONS ARE TRUE AND CORRECT:

1. HOUR AND DATE OF SAMPLING: 0930 Hours, February 19, 1985
2. SOURCE FROM WHICH SAMPLE TAKEN: 12005 N. Burgard Road, Portland Oregon, pentachlorophenol area shown on attached plot plan.
3. EQUIPMENT AND SAMPLING METHOD USED: Shovel and can used. Surface, one foot and two foot representative samples obtained, mixed together and placed in can.
4. AMOUNT OF SAMPLE OBTAINED: One (1) gallon.
5. TYPE OF CONTAINER INTO WHICH SAMPLE WAS PLACED: New one gallon paint can
6. THE SAMPLING EQUIPMENT USED, AND THE CONTAINER INTO WHICH THE SAMPLE WAS PLACED, WERE THEMSELVES UNCONTAMINATED BEFORE USE. Yes.
7. AT THE TIME OF SAMPLING I AFFIXED A LABEL TO THE CONTAINER IN THE FOLLOWING FORM WITH THE FOLLOWING INFORMATION (FILL IN THIS PORTION, INCLUDING YOUR SIGNATURE, JUST AS IT APPEARS ON THE LABEL YOU PREPARED):

GENERATOR: <u>Time Oil Co.</u> WASTE NAME: <u>Pentachlorophenol mixture.</u> SAMPLE HOUR/DATE: <u>0930 Hours, Feb. 19, 1985</u> PROFILE SHEET CODE: <u>E 13588</u> SAMPLER SIGNATURE: <u>Neil E. Wallis</u>
---

WITNESS VERIFICATION: I WAS PERSONALLY PRESENT DURING THE SAMPLING DESCRIBED; I DIRECTED THE WASTE SOURCE TO BE SAMPLED; AND I VERIFY THE INFORMATION ABOVE NOTED.

WITNESS: John H. Somes

SIGNATURE: John H. Somes

TITLE: General Manager

EMPLOYER: North West Vacuum Truck Service

DATE: February 19, 1985

SAMPLER NAME: Neil E. Wallis

SIGNATURE: Neil E. Wallis

TITLE: Terminal Manager

EMPLOYER: Time Oil Co.

DATE: February 19, 1985

LABORATORY REVIEW OF SAMPLING PROTOCOL  
 BASED UPON MY REVIEW OF THE ABOVE PROFILE SHEET  
 I CONCLUDE THAT THE ABOVE METHODOLOGY IS:

- ☐ ADEQUATE FOR YIELDING A REPRESENTATIVE SAMPLE  
☐ INADEQUATE FOR THE REASONS NOTED HEREON.

DATE: \_\_\_\_\_

LAB MGR: \_\_\_\_\_



BASE/NEUTRAL EXTRACTABLES  
METHOD 625  
8470

PARAMETER

BIS(2-CHLOROETHYL) ETHER  
1,3-DICHLOROBENZENE  
1,4-DICHLOROBENZENE  
1,2-DICHLOROBENZENE  
HEXACHLOROETHANE  
N-NITROSO-DI-N-PROPYLAM.  
NITROBENZENE  
ISOPHORONE  
BIS(2-CHLOROETHOXY) METH  
1,2,4-TRICHLOROBENZENE  
NAPHTHALENE  
HEXACHLOROBUTADIENE  
HEXACHLOROCYCLOPENTADIENE  
2-CHLORONAPHTHALENE  
ACENAPHTHYLENE  
DIMETHYLPHTHALATE  
2,6-DINITROTOLUENE

PESTICIDES/PCB'S  
METHOD 606

PARAMETER

ALPHA-BHC  
BETA-BHC  
LINDANE  
HEPTACHLOR  
ALDRIN  
P,P'-DDE  
P,P'-DDD  
P,P'-DDT

PCB GROUP 1 INCLUDES PCB'S 1  
1242 AND IS CALCULATE  
PCB GROUP 2 INCLUDES PCB'S 1  
AND IS CALCULATED AS  
PCB GROUP 3 INCLUDES PCB'S 11  
AND IS CALCULATED AS 1

Solo



HOME 735-5949

JOHN L. SMITS  
Environmental Analyst  
NORTH COAST BRANCH OFFICE, ASTORIA

Department of Environmental Quality  
Clatsop County Courthouse  
P.O. Box 869  
Astoria 97103

239-5240  
Phone 325-8660

Coffee lab

3/15/85

Sample 2 1017  
penta 275 mg/kg  
tetra  
2345 3.1 ppm  
2346 10.6 ppm  
2356 0.35 ppm

Sample 2 1018  
penta 167.5 ppm  
tetra  
2345 1.3 ppm  
2346 1.9 ppm  
2356 7.1 ppm

## BASE/NEUTRAL EXTRACTABLES

METHOD 625  
8270

## PARAMETER

BIS(2-CHLOROETHYL) ETHER  
1,3-DICHLOROBENZENE  
1,4-DICHLOROBENZENE  
1,2-DICHLOROBENZENE  
HEXACHLOROETHANE  
N-NITROSO-DI-N-PROPYLAMINE  
NITROBENZENE  
ISOPHORGNE  
BIS(2-CHLOROETHOXY) METHANE  
1,2,4-TRICHLOROBENZENE  
NAPHTHALENE  
HEXACHLOROBUTADIENE  
HEXACHLORO?CYCLOPENTADIENE  
2-CHLORONAPHTHALENE  
ACENAPHTHYLENE  
DIMETHYLPHTHALATE  
2,6-DINITROTOLUENE

PESTICIDES/PCB'S  
METHOD 606

## PARAMETER

ALPHA-BHC  
BETA-BHC  
LINDANE  
HEPTACHLOR  
ALDRIN  
P,P'-DDE  
P,P'-DDD  
P,P'-DDT

PCB GROUP 1 INCLUDES PCB'S 1221, 1232,  
1242 AND IS CALCULATED AS 1242.  
PCB GROUP 2 INCLUDES PCB'S 1249, 1254  
AND IS CALCULATED AS 1254  
PCB GROUP 3 INCLUDES PCB'S 1260, 1262  
AND IS CALCULATED AS 1260

S.L.



John L. SMITS  
Environmental Analyst  
NORTH COAST BRANCH OFFICE, ASTORIA

## PARAMETER

ACENAPHTHENE  
2,4-DINITROTOLUENE  
FLUORENE  
DIETHYLPHTHALATE  
N-NITROSODIPHENYLAMINE  
4-BROMOPHENYL PHENYL ETHER  
HEXACHLOROBENZENE  
PHENANTHRENE  
ANTHRACENE  
DIBUTYL PHTHALATE  
FLUORANTHENE  
PYRENE  
BUTYL BENZYL PHTHALATE  
BENZ(A)ANTHRACENE  
CHRYSENE  
3,3'-DICHLOROBENZIDINE  
BIS(2-ETHYLHEXYL) PHTHALATE  
BENZ(A)PYRENE

## PARAMETER

TOXAPHENE  
PCB GROUP 1  
PCB GROUP 2  
PCB GROUP 3  
TOTAL PCB

ACID EXTRACTABLES  
METHOD 625  
8270

=====

PARAMETER

=====

PHENOL  
2-CHLOROPHENOL  
2-NITROPHENOL  
2,4-DIMETHYLPHENOL  
2,4-DICHLOROPHENOL  
4-CHLORO-3-METHYLPHENOL

=====

PARAMETER

=====

2,4,6-TRICHLOROPHENOL  
2,4-DINITROPHENOL  
4-NITROPHENOL  
2-METHYL-4,6-DINITROPHENOL  
PENTACHLOROPHENOL  
TETRACHLOROPHENOLS \*\*

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

PESTICIDES  
METHOD 625  
8270

=====

PARAMETER

=====

ALPHA-BHC  
HEPTACHLOR  
ALDRIN  
HEPTACHLOR EPOXIDE  
ENDOSULFAN I  
TRANS-NONACHLOR  
P,P'-DDE

=====

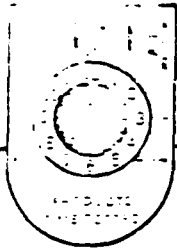
PARAMETER

=====

DIELDRIN  
ENDRIN  
ENDOSULFAN II  
P,P'-DDD  
ENDOSULFAN CYCLIC SULFATE  
P,P'-DDT  
GAMMA-BHC (LINDANE)

EP Tox Lead

In addition to these specific chemicals we will identify and quantitate any other organic that is observed with the extraction/GCMS procedure.



# TIME OIL COMPANY

2737 WEST COMMODORE WAY  
P.O. BOX 24447 TERMINAL STATION

SEATTLE WASHINGTON 98135-0001  
SEATTLE WASHINGTON 98135-0001

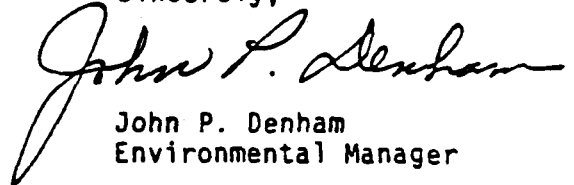
July 29, 1985

Chem-Security Systems, Inc.  
P.O. Box 1866  
Bellevue, WA 98009

Dear Sirs:

Attached is check 24607 as payment in full for disposal services as shown on your invoice 1447 dated June 30, 1985.

Sincerely,

  
John P. Denham  
Environmental Manager

Attachment a/s

JPD/ch

# TIME OIL CO.

1000 1ST AVENUE, SUITE 1000 SEATTLE WASHINGTON 98104

DATE  
7-29-85

7-29-85

CHEM-SECURITY SYSTEMS, INC.  
P.O. BOX 1866  
SEATTLE, WA 98109

PROTECTED AMOUNT	AMOUNT
\$ ***27,270.88***	\$ ***27,270.88***

BY *[Signature]*  
BY *[Signature]*

⑆024607⑆ ⑆021308176⑆ 30991597⑆

## TIME OIL CO.

24607

INVOICE	REFERENCE NO.	AMOUNT	INVOICE	REFERENCE NO.	AMOUNT
Inv. # 1447					

CHECK DATE	7-29-85	DISCOUNT	
CHECK NO.	24607	TOTAL	\$27,270.88

WHEN DETACHED AND PAID, THIS CHECK BECOMES A RECEIPT IN FULL PAYMENT OF THE ITEMIZED ACCOUNT

CHEM-SECURITY SYSTEMS, INC.  
STAR ROUTE  
ARLINGTON OR 97812  
503/454-3843

SERVICE PROVIDED BY:  
IN FACILITY

TIME OIL CO  
12005 N BURGARD RD  
PORTLAND OR 97203

NET 30 DAYS AFTER  
INVOICE DATE

ALL PAYMENTS MUST BE MADE WITHIN  
THE FIRST AT TWO PERCENT PER ANNUM  
THE MAXIMUM RATE ALLOWED BY LAW  
WHICHEVER IS LESS

CUSTOMER ACCOUNT NUMBER

450 450 4010607

INVOICE NUMBER	INVOICE DATE	PAGE
1447	06/30/85	1

350703

SERVICE DATE	REFERENCE NO./DESC	UNIT	QUANTITY	RATE	AMOUNT
6/25/85	0000073813-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	25.22 24.72	PDX-E13588 110.0000 2.1300	2,774.20 52.65 SUBTOTAL 2,826.85 *
6/26/85	0000073825-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	27.05 26.51	PDX-E13588 110.0000 2.1300	2,975.50 56.47 SUBTOTAL 3,031.97 *
6/26/85	0000073826-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	26.83 26.29	PDX-E13588 110.0000 2.1300	2,951.30 56.00 SUBTOTAL 3,007.30 *
6/26/85	0000073848-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	26.96 26.42	PDX-E13588 110.0000 2.1300	2,965.60 56.27 SUBTOTAL 3,021.87 *
6/27/85	0000073850-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	27.71 27.16	PDX-E13588 110.0000 2.1300	3,048.10 57.85 SUBTOTAL 3,105.95 *
6/27/85	0000073851-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	27.14 26.60	PDX-E13588 110.0000 2.1300	2,985.40 56.66 SUBTOTAL 3,042.06 *
6/28/85	0000073873-01 DISPOSAL SERVICES FEDERAL TAX	PCP CONTAMINATED SOIL OR TONS OR DRY TON	27.36 26.81	PDX-E13588 110.0000 2.1300	3,009.60 57.11 SUBTOTAL 3,066.71 *

REMIT TO  
ADDRESS

P. O. BOX 1866  
BELLEVUE

WA 98009

PLEASE PAY  
THIS AMOUNT

CONTINUED

THANK YOU FOR YOUR BUSINESS!

ORIGINAL INVOICE

BZTO104(e)011596





CHEM-SECURITY SYSTEMS, INC.

STAR ROUTE

ARLINGTON

503/454-2643

OR 97812

NET 30 DAYS AFTER  
INVOICE DATE

SERVICE PROVIDED BY:  
ARLINGTON FACILITY

TIME OIL CO

12005 N BURGARD RD

PORTLAND

OR 97203

450 450 401060

INVOICE NUMBER

1447 06/30/85

850703

SERVICE DATE	REFERENCE NO./DESC	UNIT	QUANTITY	RATE	AMOUNT
06/28/85	0000073874-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.95	110.0000	3,074.50
	FEDERAL TAX	OR DRY TON	27.39	2.1300	58.34
				SUBTOTAL	3,132.84
06/28/85	0000073876-01	PCP CONTAMINATED SOIL		PDX-E13588	
	DISPOSAL SERVICES	OR TONS	27.08	110.0000	2,978.80
	FEDERAL TAX	OR DRY TON	26.54	2.1300	56.53
				SUBTOTAL	3,035.33

REMIT TO  
ADDRESS

P. O. BOX 1866  
BELLEVUE

WA 98009

PLEASE PAY  
THIS AMOUNT

27,270.88\*

THANK YOU FOR YOUR BUSINESS!

BZTO104(e)011597

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. **0 R 2 0 0 9 5 9 7 5 4 3** Manifest Document No. **135588**

2. Page 1 of 1

Information in the shipping paper is not required by Federal law

3. Generator's Name and Mailing Address

**Time Oil Co.**  
**12005 N. Burgard Road Portland, Oregon 97203**

4. Generator's Phone (206) 285-2100

5. Transporter 1 Company Name

**Oregon Transfer Inc.**

6. US EPA ID Number

**0 R 2 0 5 0 9 7 3 4 3 7**

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address

**Chem-Security Systems, Inc.**  
**Star Route**  
**Arlington, Oregon 97812**

10. US EPA ID Number

**ORD 089 452 353**

A. State Manifest Document Number

B. State Generator's ID

C. State Transporter's ID

D. Transporter's Phone (503) 455-7500

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

H. Facility's Phone

**503-454-2643**

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)

a. **22. Solid Waste Pentachlorophenol Mixture, CWM-E, NA 2020 (22 10)**

12. Containers  
No. Type

**0 0 1 DT**

13. Total Quantity

**502.50**

14. Unit Vol

**P**

EPA/I Waste No

**U2L2**

J. Additional Descriptions for Materials Listed Above

a. **PCP Contaminated Soil, Solid**

b.

c.

d.

K. Hazard Codes for Waste Listed Above

**E13588**

**AREA S D C FR LRS**

**F0 23 Q C 4**

**GAL**

13. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. **E13588**

b.

c.

d.

**D-81**

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

**John P. Denham Environmental Manager**

Signature

*John P. Denham*

Date

**10 6 25 18**

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

**Gerald Schaefer**

Signature

*Gerald Schaefer*

Date

**10 6 25 18**

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date

**10 6 25 18**

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name

**Barb Trullinger**

Signature

*Barb Trullinger*

Date

**10 6 25 18**

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)011598

# UNIFORM HAZARDOUS WASTE MANIFEST

Generator's US EPA ID No.

000009597513

Manifest Document No.

000009597513

Page 1 of 1

Information on this manifest is not required by Federal law

3. Generator's Name and Mailing Address

Time Oil Co.

12005 N. Burgard Road

Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

4. State Manifest Document Number

5. State Generator's ID

5. Transporter 1 Company Name

Grechen Transfer Inc.

6. US EPA ID Number

0000050973437

C. State Transporter's ID

D. Transporter's Phone (503) 555-75

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.

Star Route

Arlington, Oregon 97812

10. US EPA ID Number

ORD 089 452 353

G. State Facility's ID

H. Facility's Phone

503-454-2643

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)

RM

000 Solid Waste Pentachlorophenol Mixture, CPN-E, NA 2020 (RQ 10)

12. Containers No. Type

167 002 D 154320

13. Total Quantity

14. Unit Wt/Vol

EPA/L Waste No

P

U212

1. Additional Descriptions for Materials Listed Above

a. POP Contaminated Soil, Solid

b.

c.

d.

K. WPS Codes for Materials Listed Above

E13588

AREA S D Q FR L 34 T-1023 Q C 4 GAL

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. E13588

b.

c.

d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

John P. Donham Environmental Manager

Signature

John P. Donham

Date

Month Day Year 06 25 08

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Elgin Taylor

Signature

Elgin Taylor

Date

Month Day Year 06 25 08

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

There was only 1 DT rec'd, not 2 rec'd Manifest, chgd with John Donham's permission per Joyce Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name

Barb Trullinger

Signature

Barb Trullinger

Month Day Year

06 25 08

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)011599

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

ORD 009597543

Manifest Document No.

00700

2. Page 1 of 1

Information not required by law

3. Generator's Name and Mailing Address

Pine Oil Co.

12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone (206) 205-2400

5. Transporter 1 Company Name

Gresham Transfer Inc.

6. US EPA ID Number

ORD 005097343

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.

Star Route

Arlington, Oregon 97812

10. US EPA ID Number

ORD 089 452 353

A. State Manifest Date

B. State Generator's ID

C. State Transporter's ID

D. Transporter's Phone (206) 205-1700

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

H. Facility's Phone

503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

UN

• RQ Solid Waste Pentachlorophenol Mixture, ORM-E, NA 2020 (RQ 10)

12. Containers

No. 100

003 DT

13. Total Quantity

537.00

14. Unit

P

EPA/1. Waste No

0012

J. Additional Descriptions for Materials Listed Above

a. PCF Contaminated Soil, Solid

b.

c.

d.

K. Handling Codes for Waste (Use Abbrev.)

E13588

23.1

AREA S D G FR LBS

E10230C4

536

GAL

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. E12506

b.

c.

d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

John P. Denham Environmental Manager

Signature

John P. Denham

Date

Month Day Year

06 25 18

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Bill Morrison

Signature

Bill Morrison

Date

Month Day Year

06 25 18

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date

Month Day Year

19. Discrepancy Indication Space There was only 1 DT rec'd, not 3 rec'd. Manifest chgd with John Denham's permission per Jeff Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name

Bobb Trullinger

Signature

Bobb Trullinger

Date

Month Day Year

10 24 18

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)011600

# UNIFORM HAZARDOUS WASTE MANIFEST

Generator's US EPA ID No. 0 R D 0 0 9 5 9 7 5 4 3 1 4 3 7 5 9

Manifest Document No. 0 0 9 5 9 7 5 4 3 1 4 3 7 5 9

2. Page 1 of 1

Information on this form is not required by Federal law.

3. Generator's Name and Mailing Address

Time Oil Co.

12005 N. Burgard Road

Portland, Oregon 97203

4. Generator's Phone (206) 285-2100

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name

Brookman Transfer Inc.

6. US EPA ID Number

0 R D 0 0 5 0 9 7 3 4 3 7

C. State Transporter's ID

D. Transporter's Phone (503) 455-1

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.

Star Route

Arlington, Oregon 97812

10. US EPA ID Number

ORD 089 452 353

G. State Facility's ID

H. Facility's Phone

503-454-2643

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)

(HMI)

a. EQ Solid Waste Pentachlorophenol Mixture, CRF-E, NA 2020 (EQ 10)

12. Containers

No.

13. Total Quantity

14. Unit Wt/Vol

EPA/I Waste #

0 0 1 DT

53840

P

U2L2

b.

c.

d.

1. Additional Descriptions for Materials Listed Above

a. POP Contaminated Soil, Solid

b.

c.

d.

K. Hazard Codes for Waste Listed Above

E13588

AREA S D Q F

T-10 22 Q F 4

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a.

b. EL3588

c.

d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

John P. Denham Environmental Manager

Signature

John P. Denham

Date

Month Day

0 6 2 6

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Gerald Schafer

Signature

Gerald Schafer

Date

Month Day

0 6 2 6

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day

19. Discrepancy Indication Space There was only 1 DT rec'd, not 4 rec'd. Manifest chgd with John Denham's permission per Joyce Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name

Burr Trullinger

Signature

Burr Trullinger

Month Day

10 11

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)011601

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

Information on this form is not required by Federal law

3. Generator's Name and Mailing Address

Gene Oil Co.  
12005 N. Burgard Road Portland, Oregon 97203

4. Generator's Phone (206) 255-2400

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name

Snodgrass Transport Inc.

6. US EPA ID Number

0000500073137

C. State Transporter's ID

D. Transporter's Phone (503) 255-7

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.  
Star Route  
Arlington, Oregon 97812

10. US EPA ID Number

ORD 039 452 353

G. State Facility's ID

H. Facility's Phone 503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

HAZ

12. Containers No. 1 Type B

13. Total Quantity 55380

14. Unit Wt/Vol P

EPA/I Waste No U212

a. RQ Solid Waste Pentachlorophenol Mixture, CP1-E, NA 2020 (RQ 10)

005DT

55380

P

U212

J. Additional Descriptions for Materials Listed Above

a. POP Contaminated Soil, Solid  
b.  
c.  
d.

K. Handling Codes for V, C, E, F, T, A, B, C, U, Y

E13588

22

AHEA 6 D Q PR L5355

I-1023 Q I 4 GAL

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. E13508  
b.  
c.  
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name John E. Bertram Environmental Manager

Signature John E. Bertram

Date Month Day 06/26/01

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date Month Day 06/26/01

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Date Month Day

19. Discrepancy Indication Space

There was only 1 DT rec'd, not 5. Manifest chgd with John Bertram's permission per Carl Johnson. (BT)

20. Facility Owner or Operator. Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name Barb Trullinger

Signature Barb Trullinger

Date Month Day 10/27/01

ORIGINAL-RETURN TO GENERATOR

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

PRD 009597543

Manifest Document No.

13588

2. Page 1 of 1

Information on this form is not required by Federal law

3. Generator's Name and Mailing Address

Time Oil Co.

12005 N. Burgard Road

Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

A. State Manifest Document Number

B. State Generator's ID

5. Transporter 1 Company Name

Crosby Transfer Inc.

6. US EPA ID Number

PRD 050973437

C. State Transporter's ID

D. Transporter's Phone (503) 455-1111

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.

Star Route

Arlington, Oregon 97812

10. US EPA ID Number

ORD 039 452 353

G. State Facility's ID

H. Facility's Phone

503-454-2643

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)

(HMI)

a. P01 Solid Waste Pentachlorophenol Mixture, OCM-B, NA 1020 (P2 10)

12. Containers No. 18

006 BT

13. Total Quantity 53250

14. Unit Wt/Vol P

EPA/1 Waste N U2L2

1. Additional Descriptions for Materials Listed Above

a. POP Contaminated Soil, Solid  
b.  
c.  
d.

K. Loading Codes for Waste (EPA 1991)

E13588

AREA S D Q I 4 GAL

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. E13588  
b.  
c.  
d.

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

John P. Denham Environmental Manager

Signature

John P. Denham

Date

Month Day Year 06 12 06

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Elaine Taylor

Signature

Elaine Taylor

Date

Month Day Year 06 12 06

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

19. Discrepancy Indication Space

There was only 1 BT rec'd, not 6. Manifest crgd with John Denham's permission, Jane Johnson. (BT)

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name

Burr Trullinger

Signature

Burr Trullinger

Date

Month Day Year 06 12 06

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)011603

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. **0.R.D.0.0.9.5.9.7.5.4.3**

2. Page 1 of 1 Information on this manifest form not required by Federal law

3. Generator's Name and Mailing Address  
**Cine Co.**  
**12005 N. Burgard Road Portland, Oregon 97203**

A. State Manifest Document Number  
 B. State Generator's ID

4. Generator's Phone (206) 285-2100

5. Transporter 1 Company Name  
**Creshan Transfer Inc.**

C. State Transporter's ID  
 D. Transporter's Phone (503) 452-1111

6. US EPA ID Number  
**0.R.D.0.5.0.9.7.3.4.3.7**

7. Transporter 2 Company Name

E. State Transporter's ID  
 F. Transporter's Phone

8. US EPA ID Number

9. Designated Facility Name and Site Address  
**Chem-Security Systems, Inc.**  
**Star Route**  
**Arlington, Oregon 97812**

G. State Facility's ID

H. Facility's Phone  
**503-454-2643**

10. US EPA ID Number  
**ORD 089 452 353**

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers	13. Total Quantity	14. Unit	EPA/1
No.	Type		Wt/Vol	Waste No.
a. <b>01</b>	<b>DT</b>	<b>54620</b>	<b>P</b>	<b>U212</b>
b.				
c.				
d.				

J. Additional Descriptions for Materials Listed Above  
 a. **PCP Contaminated Soil, Solid**

K. Handling Codes for Wastes Listed Above  

WPS	CU. FT.	CU. YD.
<b>E13588</b>		<b>23.16</b>
AREA	S	D
	<b>Q</b>	<b>PR</b>
		<b>LBS</b>
		<b>5472</b>

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)  
 a. **E13588**

**T-1023 Q C 4 GAL**

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

**0-81**

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name **John I. Denham Environmental Manager** Signature **John I. Denham** Date **06/28/88**

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name **Gerald Schafer** Signature **Gerald Schafer** Date **06/28/88**

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name **Donella Plough** Signature **Donella Plough** Date **1/6/88**

ORIGINAL-RETURN TO GENERATOR



# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

C R D 0 0 9 5 9 7 5 1 3

2. Page 1 of 1

Information in the second column not required by Federal law

3. Generator's Name and Mailing Address

Tire Oil Co.

12005 N. Burgard Road

Portland, Oregon 97203

4. Generator's Phone (205) 255-2400

5. Transporter 1 Company Name

Gresham Transfer Inc.

6. US EPA ID Number

E R D 0 5 0 9 7 3 4 3 7

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.

Star Route

Arlington, Oregon 97812

10. US EPA ID Number

ORD 089 452 353

C. State Transporter's ID

D. Transporter's Phone (503) 255-70

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

H. Facility's Phone

503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

(HM)

a. Solid Waste Pentachlorophenol Mixture, CEM-E, NA 2020 (RQ 10)

12. Containers

No. Type

0 0 1 DT

13. Total Quantity

56.830

14. Unit

F

EPA/L

Waste No

0212

J. Additional Descriptions for Materials Listed Above

a. PCP Contaminated Soil, Solid

K. Handling Codes for Wastes Listed Above

WPS CU FT CU YD

E13588 21 2

AREA S D O PR LBS

55900

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. E13588

F10 B3 Q1 C4

D-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

John P. Berham Environmental Manager

Signature

John P. Berham

Date

Month Day Yr  
0 6 12 8 10

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

Bill Morrison

Signature

Bill Morrison

Month Day Yr

0 6 12 8 10

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Yr

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name

Danella Clough

Signature

Danella C. Clough

Date

Month Day Yr  
1 6 12 8 10

ORIGINAL - RETURN TO GENERATOR

BZTO104(e)011605

# UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

OR 0009597543

Manifest Document No.

3577

Page 1 of 1

Not required by Federal law

3. Generator's Name and Mailing Address

Tine Oil Co.

12005 N. Burgard Road

Portland, Oregon 97203

4. Generator's Phone (206) 285-2400

State Manifest Document Number

E. State Generator's ID

5. Transporter 1 Company Name

Orphan Transfer Inc.

6. US EPA ID Number

OR D 050973437

C. State Transporter's ID

D. Transporter's Phone (503) 454-1515

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address

Chem-Security Systems, Inc.

Star Route

Arlington, Oregon 97812

10. US EPA ID Number

ORD 089 452 353

G. State Facility's ID

H. Facility's Phone

503-454-2643

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)

12. Containers

No.

Type

13. Total Quantity

14. Unit Wt/Vol

EPA/Waste No

a. EQ Solid Waste Pentachlorophenol Mixture, CPK-E, NA 2020 (EQ 10)

001

DT

54380

F

U242

b.

c.

d.

J. Additional Descriptions for Materials Listed Above

a. PCP Contaminated Soil, Solid

b.

c.

d.

WPS						CU. FT		CU. YD.	
E13588								24.53	
AREA	S	D	G	PR	LBS				
T-10	33	Q	C	L	54120				
						1 GAL			

15. Special Handling Instructions and Additional Information Waste Profile Sheet Number(s)

a. 113588

b.

c.

d.

0-81

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations.

Printed/Typed Name

John P. Denham Environmental Manager

Signature

John P. Denham

Date

Month Day Y 06/28/88

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name

John P. Denham

Signature

John P. Denham

Date

Month Day Y 06/28/88

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name

Signature

Month Day Y

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Printed/Typed Name

Donella Plough

Signature

Donella Plough

Date

Month Day Y 06/28/88

ORIGINAL-RETURN TO GENERATOR

BZTO104(e)011606

DRY  
TON

TONS

50,280.00 ÷  
2,000.00 =  
25.14 \*

54,320.00 ÷  
2,000.00 =  
27.16 \*

53,700.00 ÷  
2,000.00 =  
26.85 \*

53,840.00 ÷  
2,000.00 =  
26.92 \*

55,280.00 ÷  
2,000.00 =  
27.64 \*

53,280.00 ÷  
2,000.00 =  
26.64 \*

54,260.00 ÷  
2,000.00 =  
27.13 \*

56,820.00 ÷  
2,000.00 =  
28.41 \*

54,280.00 ÷  
2,000.00 =  
27.14 \*

2 4 7 2  
2 6 5 1  
2 6 2 9  
2 6 4 2  
2 7 1 6  
2 6 6 0  
2 6 8 1  
2 7 3 9  
2 6 5 4  
2 3 8 4 4 \*

2 5 2 2  
2 7 0 5  
2 6 8 3  
2 6 9 6  
2 7 7 1  
2 7 1 4  
2 7 3 6  
2 7 9 5  
2 7 0 8  
2 4 3 3 0 \*

<u>DATE</u>	<u>LOADED AT NW</u>	<u>UNLOADED AT CSS</u>	<u>CHANGE ENROUTE</u>
6/25/85	25.14	25.22	-.08
6/25/85	27.16	27.05	+.11
6/25/85	26.85	26.83	+.02
6/26/85	26.92	26.96	-.04
6/26/85	27.64	27.71	-.07
6/26/85	26.64	27.14	-.50
6/28/85	27.13	27.36	-.23
6/28/85	28.14	27.95	+.19
6/28/85	<u>27.14</u>	<u>27.08</u>	<u>+.06</u>
Total Tons	242.76	243.30	
Average Tons	26.97	27.03	-.54

Nine truckloads shipped. Total quantity received at destination was within 1/2 ton of quantity loaded. Good show.



## Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE (503) 229-5600

June 28, 1985

John Denham  
Time Oil Co.,  
2737 W. Commodore Way  
Seattle, Washington 98199

Dear John:

Attached is a copy of a letter describing our 600 ppm interpretation of the hazardous waste pesticide rule for chlorophenolics.

Please note that it is used as a guidance for the determination of hazardous waste material and does not reflect subsequent clean-up level requirements. The clean-up criteria should be available from our Northwest Regional Office or our Hazardous Waste Program.

Sincerely,

Richard F. Gates  
Supervising Chemist - Organic Laboratory  
Environmental Quality Laboratories  
and Applied Research  
1712 SW Eleventh Avenue  
Portland, Oregon 97201

RTG:mll

cc: Janet Gillaspie  
Gary Calaba

Encls.



*Thiel Jette Lab*  
*W. D. Desser, Salem*  
**Department of Environmental Quality**

**PER TF**

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE: (503) 229-5696

January 17, 1985

[REDACTED]

Re: Your Letter of 1/3/85

The actual rule that the leach test is intended to simulate is OAR 340-101-034(1)(d) (enclosed). As you can see, the rule refers to conducting a bioassay on pesticide residue, the results of which determine whether or not the residue is a hazardous waste.

In a June 7, 1984 letter to industry, we cited 600 mg/l total chlorophenols as the hazardous waste threshold. This was meant to include -phenates as well. It was derived from some recent EPA data which indicated an average LC<sub>50</sub> of 0.15 mg/l for salmonid with little toxicological difference between penta- or tetrachlorophenol or -phenate. Thus, if you place 250 mg/l of a residue containing 600 mg/l penta in water, and the penta is 100% leached, you will get a solution of 0.15 mg/l penta. Hence, the 600 mg/l number. However, we would emphasize that the 600 mg/l total chlorophenols is only an approximation which we suggest as being routinely acceptable for determining proper waste disposal. If there is any reason to contest a generator's characterization of his waste, or any reason to suspect improper waste disposal, we would go back to the required bioassay to make a definitive determination.

[REDACTED]

Our data suggest that 75 to 100% chlorophenols (-phenates) are usually leached from sawdust, dirt, planer shavings, etc.

Please call if me at area code (503) 229-6210 if you wish further discussion. We would appreciate receiving any information you may care to share with us on this subject.

Sincerely,

*FB*

Fred S. Bromfeld  
Senior Environmental Engineer  
Hazardous Waste Operations  
Solid Waste Division

State of Oregon  
Department of Environmental Quality  
**RECEIVED**

JAN 28 1985

FSB:b  
ZB4168

Enclosure(s) Environmental Quality Laboratories

**RECEIVE**

JAN 18 1985

State of Oregon  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
SALEM, OFFICE

BZTO104(e)011610

"Imageneering a cleaner world"



**RIEDEL  
ENVIRONMENTAL SERVICES, INC.**

- ☒ Portland Division  
Environmental Services, Inc.  
P.O. Box 1000  
Portland, OR 97208  
503-236-1666
- ☐ St. Louis Division  
529 South St. Louis Blvd.  
Chesterfield, MO 63017  
314-532-1666
- ☐ San Francisco Division  
2300 Durant Blvd.  
Richmond, CA 94801  
415-234-1600
- ☐ Seattle Division  
301 Fairview Ave. N.  
P.O. Box 1130  
Seattle, WA 98111  
206-422-1900

August 15, 1985

Mr. John P. Denham  
Environmental Manager  
Time Oil Company  
2737 W. Commodore Way  
PO Box 24447 Terminal Annex  
Seattle, WA 98124

Dear John:

Enclosed are the sample results and contour maps as you requested.

I hope to see you soon.

Sincerely,

John H. Ruddick  
Microbiologist

JHR:rrh  
Enclosures

For Fast Emergency Response, Call Environmental Emergency Services Co.  
on 24-Hour Hotline (800) 334-0004

BZTO104(e)011611

TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Surface Contour Data

Sample #	Coordinates		Concentration Mg/Kg	Core #	Coordinates		Concentration Mg/Kg
	X	Y			X	Y	
1	81	171	13500	J	142.5	161	1400
2	71	171	29	K	117.5	161	N/A
3	71	161	500	L	92.5	161	N/A
4	71	151	5450	M	67.5	161	4720
5	71	141	5560	N	155	143	4280
6	71	131	8760	O	130	143	3000
7	71	121	4870	P	105	143	N/A
8	71	111	92	Q	80	143	N/A
9	71	101	20	R	142.5	125	1712
10	81	181	16	S	117.5	125	522
11	71	181	7	T	92.5	125	123
12	61	181	9	U	67.5	125	26550
13	61	171	95	V	155	107	317
14	61	161	175	W	130	107	3385
15	61	151	18	X	105	107	N/A
16	61	141	229	Y	80	107	N/A
17	61	131	88	Z	80	179	21
18	61	121	6				
19	61	111	3				
20	61	101	2.5				
21	61	91	5.2				
37	81	95	857				
38	91	96	1130				
39	101	97	17				
40	111	98	3.5				
41	121	98	3.1				
42	131	99	3.2				
43	141	100	2.4				
44	151	100	1.8				
45	161	101	171				
46	71	84	3				
47	81	85	3.6				
48	91	86	6.1				
49	121	87	3.2				
50	131	88	1.5				
51	141	89	2.3				
52	151	90	1.7				
53	161	91	1.9				
54	171	92	1.2				

N/A = Not Available



TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

<u>Core #</u>	<u>Coordinates</u>		<u>Concentration</u>
	<u>X</u>	<u>Y</u>	<u>Mg/Kg</u>
J	142.5	161	3
K	117.5	161	8.8
L	92.5	161	N/A
M	67.5	161	87
N	155	143	3.1
O	130	143	59
P	105	143	16
Q	80	143	N/A
R	142.5	125	34
S	117.5	125	252
T	92.5	125	123
U	67.5	125	44
V	155	107	260
W	130	107	15
X	105	107	4.5
Y	80	107	N/A
Z	80	179	14

N/A = Not Available

TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Four Foot Contour Data

<u>Core #</u>	<u>Coordinates</u>		<u>Concentration</u> <u>Mg/Kg</u>
	<u>X</u>	<u>Y</u>	
J	142.5	161	3.6
K	117.5	161	10.5
L	92.5	161	7200
M	67.5	161	22
N	155	143	238
O	130	143	23
P	105	143	15
Q	80	143	2205
R	142.5	125	50
S	117.5	125	184
T	92.5	125	534
U	67.5	125	55
V	155	107	380
W	130	107	8.1
X	105	107	1.3
Y	80	107	598
Z	80	179	2

Calweld Analysis  
of Treatment Feasibility  
- pentachlorophenol

WEST COAST ANALYTICAL SERVICE, INC  
9840 Alburtil Ave.  
Santa Fe Springs, CA 90670

Calweld/ATW  
11212 S. Norwalk Blvd.  
Santa Fe Springs, CA 90670

ATTN: Frank Manchak

October 8, 1985

Job Number 2153

Page 1 of 9

LABORATORY REPORT

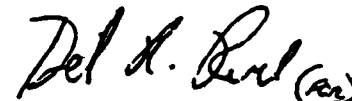
Samples: 24 soil samples  
Date Received: 9-16-85  
Purchase Order No.: 9771/Frank Manchak

The samples were analyzed for the following parameters:

	<u>EPA Method</u>
Permeability	-
Volatile Organics	8240
Semivolatile Organics	8270
PCBs	8080
Priority Pollutant Metals	7000
EP Toxicity Leachate	1310
Sulfur Dioxide	Draeger Tube

The results are summarized in the following tables. Detailed reports are enclosed on Organics Analysis Data Sheets.

  
Joe Bramblett  
Laboratory Manager

  
D.J. Northington, Ph.D.  
Technical Director

We would appreciate a telephone call if you have any questions about this report. (213) 948-2225

BZTO104(e)011615

## Data Reporting Qualifiers

Value - If the result is a value greater than or equal to the Detection Limit (DL), the value is reported.

ND - Indicates that the compound was analyzed for but not detected. The minimum DL for the sample with the ND (e.g. 10.ND) is reported based on necessary concentration or dilution actions.

TR - Indicates an estimated value. This flag is used when the mass spectral data indicates the presence of a compound that meets the identification criteria but the result is less than the specified DL but greater than zero.

J - Indicates an estimated value. This flag is used when estimating a concentration for tentatively identified compounds where a 1:1 response factor is assumed.

LABORATORY: WCAS  
LABORATORY ID: 2153B14  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 5G: 1ML: : 0. 01ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
62-75-9	N-NITROSODIMETHYLAMINE	20. ND
18-95-2	PHENOL	20. ND
62-53-3	ANILINE	20. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	20. ND
95-57-8	2-CHLOROPHENOL	20. ND
541-73-1	1, 3-DICHLOROBENZENE	20. ND
106-46-7	1, 4-DICHLOROBENZENE	20. ND
100-51-6	BENZYL ALCOHOL	20. ND
95-50-1	1, 2-DICHLOROBENZENE	20. ND
95-48-7	2-METHYLPHENOL	20. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	20. ND
106-44-5	4-METHYLPHENOL	20. ND
621-64-7	N-NITROSODIPROPYLAMINE	20. ND
67-72-1	HEXACHLOROETHANE	20. ND
98-95-3	NITROBENZENE	20. ND
78-59-1	ISOPHORONE	20. ND
88-75-5	2-NITROPHENOL	20. ND
105-67-9	2, 4-DIMETHYLPHENOL	20. ND
65-85-0	BENZOIC ACID	100. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	20. ND
120-33-2	2, 4-DICHLOROPHENOL	20. ND
120-82-1	1, 2, 4-TRICHLOROBENZENE	20. ND
91-20-3	NAPHTHALENE	20. ND
106-47-8	4-CHLOROANILINE	20. ND
87-68-3	HEXACHLOROBUTADIENE	20. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	20. ND
91-57-6	2-METHYLNAPHTHALENE	20. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	20. ND
88-06-2	2, 4, 6-TRICHLOROPHENOL	20. ND
95-95-4	2, 4, 5-TRICHLOROPHENOL	100. ND
91-58-7	2-CHLORONAPHTHALENE	20. ND
88-74-4	2-NITROANILINE	100. ND
131-11-3	DIMETHYL PHTHALATE	20. ND
208-96-8	ACENAPHTHYLENE	20. ND
99-09-2	3-NITROANILINE	100. ND

LABORATORY: WCAS  
LABORATORY ID: 2153814  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 5G: 1ML: : 0. 01ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
83-32-9	ACENAPHTHENE	20. ND
51-28-5	2, 4-DINITROPHENOL	100. ND
100-02-7	4-NITROPHENOL	100. ND
132-64-9	DIBENZOFURAN	20. ND
121-14-2	2, 4-DINITROTOLUENE	20. ND
606-20-2	2, 6-DINITROTOLUENE	20. ND
84-66-2	DIETHYL PHTHALATE	20. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	20. ND
86-73-7	FLUORENE	20. ND
100-01-6	4-NITROANILINE	100. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	100. ND
86-30-6	N-NITROSODIPHENYLAMINE	20. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	20. ND
118-74-1	HEXACHLOROBENZENE	20. ND
87-86-5	PENTACHLOROPHENOL	11000.
85-01-8	PHENANTHRENE	20. ND
120-12-7	ANTHRACENE	20. ND
84-74-2	DI-N-BUTYL PHTHALATE	20. ND
206-44-0	FLUORANTHENE	20. ND
92-87-5	BENZIDINE	100. ND
129-00-0	PYRENE	20. ND
85-68-7	BUTYL BENZYL PHTHALATE	20. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	40. ND
56-55-3	BENZO(A)ANTHRACENE	20. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	20. ND
218-01-9	CHRYSENE	20. ND
117-84-0	DI-N-OCTYL PHTHALATE	20. ND
205-99-2	BENZO(B & K)FLUORANTHENES	20. ND
50-32-8	BENZO(A)PYRENE	20. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	20. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	20. ND
191-24-2	BENZO(GHI)PERYLENE	20. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

LABORATORY: WCAS  
LABORATORY ID: 2153B14

## Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated Conc (J)
1.	Cyclic ALIPHATIC HYDROCARBONS	BVA		2000
2.	UNIDENTIFIED COMPOUNDS	BVA		900
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LABORATORY: WCAS  
LABORATORY ID: 2153B10  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 5G: 1ML: : 0. 2ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
62-75-9	N-NITROSODIMETHYLAMINE	1. ND
18-95-2	PHENOL	1. ND
62-53-3	ANILINE	1. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	1. ND
95-57-8	2-CHLOROPHENOL	1. ND
541-73-1	1,3-DICHLOROBENZENE	1. ND
106-46-7	1,4-DICHLOROBENZENE	1. ND
100-51-6	BENZYL ALCOHOL	1. ND
95-50-1	1,2-DICHLOROBENZENE	1. ND
95-48-7	2-METHYLPHENOL	1. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	1. ND
106-44-5	4-METHYLPHENOL	1. ND
621-64-7	N-NITROSODIPROPYLAMINE	1. ND
67-72-1	HEXACHLOROETHANE	1. ND
98-95-3	NITROBENZENE	1. ND
78-59-1	ISOPHORONE	5.
88-75-5	2-NITROPHENOL	1. ND
105-67-9	2,4-DIMETHYLPHENOL	1. ND
65-85-0	BENZOIC ACID	5. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	1. ND
120-33-2	2,4-DICHLOROPHENOL	1. ND
120-82-1	1,2,4-TRICHLOROBENZENE	1. ND
91-20-3	NAPHTHALENE	1. ND
106-47-8	4-CHLOROANILINE	1. ND
87-68-3	HEXACHLOROBUTADIENE	1. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	1. ND
91-57-6	2-METHYLNAPHTHALENE	1. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	1. ND
88-06-2	2,4,6-TRICHLOROPHENOL	1. ND
95-95-4	2,4,5-TRICHLOROPHENOL	5. ND
91-58-7	2-CHLORONAPHTHALENE	1. ND
88-74-4	2-NITROANILINE	5. ND
131-11-3	DIMETHYL PHTHALATE	1. ND
208-96-8	ACENAPHTHYLENE	1. ND
99-09-2	3-NITROANILINE	5. ND



LABORATORY: WCAS  
LABORATORY ID: 2153B10  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 5G: 1ML:: 0. 2ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
83-32-9	ACENAPHTHENE	1. ND
51-28-5	2, 4-DINITROPHENOL	5. ND
100-02-7	4-NITROPHENOL	5. ND
132-64-9	DIBENZOFURAN	1. ND
121-14-2	2, 4-DINITROTOLUENE	1. ND
606-20-2	2, 6-DINITROTOLUENE	1. ND
84-66-2	DIETHYL PHTHALATE	1. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	1. ND
86-73-7	FLUORENE	1. ND
100-01-6	4-NITROANILINE	5. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	5. ND
86-30-6	N-NITROSODIPHENYLAMINE	1. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	1. ND
118-74-1	HEXACHLOROBENZENE	1. ND
87-86-5	PENTACHLOROPHENOL	460.
85-01-8	PHENANTHRENE	1. ND
120-12-7	ANTHRACENE	1. ND
84-74-2	DI-N-BUTYL PHTHALATE	1. ND
206-44-0	FLUORANTHENE	1. ND
92-87-5	BENZIDINE	5. ND
129-00-0	PYRENE	1. ND
85-68-7	BUTYL BENZYL PHTHALATE	1. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	2. ND
56-55-3	BENZO(A)ANTHRACENE	1. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1. ND
218-01-9	CHRYSENE	1. ND
117-84-0	DI-N-OCTYL PHTHALATE	1. ND
205-99-2	BENZO(B & K)FLUORANTHENES	1. ND
50-32-8	BENZO(A)PYRENE	1. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	1. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	1. ND
191-24-2	BENZO(GHI)PERYLENE	1. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

LABORATORY: WCAS  
LABORATORY ID: 2153810

## Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated Conc (J) (PM)
1. 1825-21-4	PENTACHLOROBENZENE	B-4A	959	20
2.	CH-35 AROMATIC HYDROCARBONS	B-4A		2000
3.	UNIDENTIFIED COMPOUNDS	B-4A		1000
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LABORATORY: WCAS  
LABORATORY ID: 2153B15  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 50: 1ML: : 0. 01ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
62-75-9	N-NITROSODIMETHYLAMINE	20. ND
18-95-2	PHENOL	20. ND
62-53-3	ANILINE	20. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	20. ND
95-57-8	2-CHLOROPHENOL	20. ND
541-73-1	1,3-DICHLOROBENZENE	20. ND
106-46-7	1,4-DICHLOROBENZENE	20. ND
100-51-6	BENZYL ALCOHOL	20. ND
95-50-1	1,2-DICHLOROBENZENE	20. ND
95-48-7	2-METHYLPHENOL	20. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	20. ND
106-44-5	4-METHYLPHENOL	20. ND
621-64-7	N-NITROSODIPROPYLAMINE	20. ND
67-72-1	HEXACHLOROETHANE	20. ND
98-95-3	NITROBENZENE	20. ND
78-59-1	ISOPHORONE	20. ND
88-75-5	2-NITROPHENOL	20. ND
105-67-9	2,4-DIMETHYLPHENOL	20. ND
65-85-0	BENZOIC ACID	100. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	20. ND
120-33-2	2,4-DICHLOROPHENOL	20. ND
120-82-1	1,2,4-TRICHLOROBENZENE	20. ND
91-20-3	NAPHTHALENE	20. ND
106-47-8	4-CHLOROANILINE	20. ND
87-68-3	HEXACHLOROBUTADIENE	20. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	20. ND
91-57-6	2-METHYLNAPHTHALENE	20. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	20. ND
88-06-2	2,4,6-TRICHLOROPHENOL	20. ND
95-95-4	2,4,5-TRICHLOROPHENOL	100. ND
91-58-7	2-CHLORONAPHTHALENE	20. ND
88-74-4	2-NITROANILINE	100. ND
131-11-3	DIMETHYL PHTHALATE	20. ND
208-96-8	ACENAPHTHYLENE	20. ND
99-09-2	3-NITROANILINE	100. ND

LABORATORY: WCAS  
LABORATORY ID: 2153B15  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 5G: 1ML:: 0.01ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
83-32-9	ACENAPHTHENE	20. ND
51-28-5	2, 4-DINITROPHENOL	100. ND
100-02-7	4-NITROPHENOL	100. ND
132-64-9	DIBENZOFURAN	20. ND
121-14-2	2, 4-DINITROTOLUENE	20. ND
606-20-2	2, 6-DINITROTOLUENE	20. ND
84-66-2	DIETHYL PHTHALATE	20. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	20. ND
86-73-7	FLUORENE	20. ND
100-01-6	4-NITROANILINE	100. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	100. ND
86-30-6	N-NITROSODIPHENYLAMINE	20. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	20. ND
118-74-1	HEXACHLOROBENZENE	20. ND
87-86-5	PENTACHLOROPHENOL	10000.
85-01-8	PHENANTHRENE	20. ND
120-12-7	ANTHRACENE	20. ND
84-74-2	DI-N-BUTYL PHTHALATE	20. ND
206-44-0	FLUORANTHENE	20. ND
92-87-5	BENZIDINE	100. ND
129-00-0	PYRENE	20. ND
85-68-7	BUTYL BENZYL PHTHALATE	20. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	40. ND
56-55-3	BENZO(A)ANTHRACENE	20. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	20. ND
218-01-9	CHRYSENE	20. ND
117-84-0	DI-N-OCTYL PHTHALATE	20. ND
205-99-2	BENZO(B & K)FLUORANTHENES	20. ND
50-32-8	BENZO(A)PYRENE	20. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	20. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	20. ND
191-24-2	BENZO(GHI)PERYLENE	20. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

## ORGANICS ANALYSIS DATA SHEET

SAMPLE #: TIME B RAW DUPLICATE

LABORATORY: WCAS  
LABORATORY ID: 2153B15

## Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated Conc(J)
1.	/ Cyclic ALIPHATIC HYDROCARBONS	/ 2A	/	/ 2000
2.	/ UNIDENTIFIED COMPOUNDS	/ 2A	/	/ 900
3.	/	/	/	/
4.	/	/	/	/
5.	/	/	/	/
6.	/	/	/	/
7.	/	/	/	/
8.	/	/	/	/
9.	/	/	/	/
10.	/	/	/	/
11.	/	/	/	/
12.	/	/	/	/
13.	/	/	/	/
14.	/	/	/	/
15.	/	/	/	/
16.	/	/	/	/
17.	/	/	/	/
18.	/	/	/	/
19.	/	/	/	/
20.	/	/	/	/
21.	/	/	/	/
22.	/	/	/	/
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25.	/	/	/	/
26.	/	/	/	/
27.	/	/	/	/
28.	/	/	/	/
29.	/	/	/	/
30.	/	/	/	/

LABORATORY: WCAS  
LABORATORY ID: 2153B11  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 1)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 50: 1ML: : 0. 2ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
62-75-9	N-NITROSODIMETHYLAMINE	1. ND
18-95-2	PHENOL	1. ND
62-53-3	ANILINE	1. ND
111-44-4	BIS(2-CHLOROETHYL)ETHER	1. ND
95-57-8	2-CHLOROPHENOL	1. ND
541-73-1	1,3-DICHLOROBENZENE	1. ND
106-46-7	1,4-DICHLOROBENZENE	1. ND
100-51-6	BENZYL ALCOHOL	1. ND
95-50-1	1,2-DICHLOROBENZENE	1. ND
95-48-7	2-METHYLPHENOL	1. ND
39638-32-9	BIS(2-CHLOROISOPROPYL)ETHER	1. ND
106-44-5	4-METHYLPHENOL	1. ND
621-64-7	N-NITROSODIPROPYLAMINE	1. ND
67-72-1	HEXACHLOROETHANE	1. ND
98-95-3	NITROBENZENE	1. ND
78-59-1	ISOPHORONE	6.
88-75-5	2-NITROPHENOL	1. ND
105-67-9	2,4-DIMETHYLPHENOL	1. ND
65-85-0	BENZOIC ACID	5. ND
111-91-1	BIS(2-CHLOROETHOXY)METHANE	1. ND
120-33-2	2,4-DICHLOROPHENOL	1. ND
120-82-1	1,2,4-TRICHLOROBENZENE	1. ND
91-20-3	NAPHTHALENE	1. ND
106-47-8	4-CHLOROANILINE	1. ND
87-68-3	HEXACHLOROBUTADIENE	1. ND
59-50-7	4-CHLORO-3-METHYLPHENOL	1. ND
91-57-6	2-METHYLNAPHTHALENE	1. ND
77-47-4	HEXACHLOROCYCLOPENTADIENE	1. ND
88-06-2	2,4,6-TRICHLOROPHENOL	1. ND
95-95-4	2,4,5-TRICHLOROPHENOL	5. ND
91-58-7	2-CHLORONAPHTHALENE	1. ND
88-74-4	2-NITROANILINE	5. ND
131-11-3	DIMETHYL PHTHALATE	1. ND
208-96-8	ACENAPHTHYLENE	1. ND
99-09-2	3-NITROANILINE	5. ND

## ORGANICS ANALYSIS DATA SHEET

SAMPLE #: TIME B TREATED

DUPLICATE

LABORATORY: WCAS  
LABORATORY ID: 2153B11  
DATE RECEIVED: 09/16/85

## SEMIVOLATILE COMPOUNDS (PAGE 2)

LEVEL: MEDIUM  
MATRIX: SOIL  
DATE EXT/PREP: 09/18/85  
DATE ANALYZED: 9/25/85  
SPL-->EXTRACT: 5G: 1ML: : 0. 2ML: 1ML  
STANDARD ID: BNA46  
SENSITIVITY ID:  
UNITS: UG/G (PPM)

CAS #		CONC
=====		=====
83-32-9	ACENAPHTHENE	1. ND
51-28-5	2, 4-DINITROPHENOL	5. ND
100-02-7	4-NITROPHENOL	5. ND
132-64-9	DIBENZOFURAN	1. ND
121-14-2	2, 4-DINITROTOLUENE	1. ND
606-20-2	2, 6-DINITROTOLUENE	1. ND
84-66-2	DIETHYL PHTHALATE	1. ND
7005-72-3	4-CHLOROPHENYL PHENYL ETHER	1. ND
86-73-7	FLUORENE	1. ND
100-01-6	4-NITROANILINE	5. ND
534-52-1	4, 6-DINITRO-2-METHYLPHENOL	5. ND
86-30-6	N-NITROSODIPHENYLAMINE	1. ND
101-55-3	4-BROMOPHENYL PHENYL ETHER	1. ND
118-74-1	HEXACHLOROBENZENE	1. ND
87-86-5	PENTACHLOROPHENOL	490.
85-01-8	PHENANTHRENE	1. ND
120-12-7	ANTHRACENE	1. ND
84-74-2	DI-N-BUTYL PHTHALATE	1. ND
206-44-0	FLUORANTHENE	1. ND
92-87-5	BENZIDINE	5. ND
129-00-0	PYRENE	1. ND
85-68-7	BUTYL BENZYL PHTHALATE	1. ND
91-94-1	3, 3'-DICHLOROBENZIDINE	2. ND
56-55-3	BENZO(A)ANTHRACENE	1. ND
117-81-7	BIS(2-ETHYLHEXYL)PHTHALATE	1. ND
218-01-9	CHRYSENE	1. ND
117-84-0	DI-N-OCTYL PHTHALATE	1. ND
205-99-2	BENZO(B & K)FLUORANTHENES	1. ND
50-32-8	BENZO(A)PYRENE	1. ND
193-39-5	INDENO(1, 2, 3-CD)PYRENE	1. ND
53-70-3	DIBENZO(A, H)ANTHRACENE	1. ND
191-24-2	BENZO(GHI)PERYLENE	1. ND

RESULTS ARE REPORTED ON A WET WEIGHT BASIS.

LABORATORY: WCAS  
LABORATORY ID: 2153B11

## Tentatively Identified Compounds

CAS Number	Compound Name	Fraction	Scan	Estimated Conc (U)
1.	PENTACHLOROBENZENE	BNA	950	40
2.	CH-35 ALKYLATE HYDROCARBONS	BNA		2000
3.	UNIDENTIFIED COMPOUNDS	BNA		900
4.				
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Calweld/ATW  
Job No. 2153

October 8, 1985  
Page 9 of 9

LABORATORY REPORT

Sample: Time B (Duplicate analyses)

	Treated Mix 1	Dup.	Treated Mix 2	Dup.
Permeability (ft/day)	7 E-07	2 E-06	7 E-07	3 E-05

	ug/g (PPM)			
	Raw	Dup.	Treated Mix 1	Dup.
Base Neutral/Acids				
Pentachlorophenol	11,000	10,000	460	490
C18-C30 Hydrocarbons *	2,000	2,000	2,000	2,000
Isophorone	ND <20	ND <20	5	6
Pentachloroanisole *	ND <20	ND <20	20	40

NA = Not analyzed

\* = Approximate

TIME OIL COMPANY  
PORTLAND, OREGON

PENTACHLOROPHENOL SAMPLING & ANALYSIS

Prepared by  
RIEDEL ENVIRONMENTAL SERVICES  
P.O. Box 5007  
Portland, Oregon 97208

October 18, 1985

## Introduction

Between 1967 and 1982 Time Oil Company operated a pentachlorophenol (PCP) facility at its North Portland, Oregon, terminal. This facility consisted of blending and storage operations used to prepare commercial pentachlorophenol solutions. The facility consisted of various storage and mixing tanks, a warehouse, a bermed, unpaved containment area, various pumps and a truck loading area.

The facility geography is essentially flat and is located less than 1/4 mile from the Willamette River. The soil is principally fine to medium sand with some silt. Ground water is reportedly found from 10 to 20 feet below the surface in this area. During June of 1985, a portion of visibly contaminated soil in the containment area was excavated and disposed of as a hazardous waste. This excavation left a depression in the northwest corner of the containment area sloping gradually to approximately four feet below the adjacent grade. Surface soil was disturbed during this process and, as such, surface sampling was not expected to be representative of conditions existing prior to excavation.

During the years of operation, several intermittent PCP discharges were known to occur, especially during mixing and transfer operations. These discharges resulted in soil contamination in and around the containment area. Initial site visits in April 1985 indicated visible PCP contamination of soils in this vicinity. A sampling plan for surface and subsurface soils extending through the vadose zone was designed and initiated in July 1985.

This sampling and analytical protocol was designed to estimate the spatial limits of PCP contaminant migration in the vadose zone of the soil in and immediately adjacent to the PCP containment area facility. As such, a systematical gridding array was used in lieu of random or other types of probability sampling. No attempt was made to sample underneath structures or paved areas. The protocol was not intended to determine the average concentration of PCP in soil at the facility since the area sampled was not expected to be homogeneous nor to represent a specific population of PCP concentrations. Therefore, statistical evaluations such as mean and standard deviation, have only academic significance in respect to these data.

However, since the origin points in the regular sampling arrays were randomly selected (i.e., a systematic random sampling procedure), there is no reason why some or all of this data could not be used for this purpose at a future time.

## Sampling

All sampling was performed in accordance with EPA publication SW846, "Test Methods for Evaluating Solid Waste". Surface soil sampling was achieved using a small trier and/or sampling scoop. Subsurface samples were obtained using a 6" continuous flight hollow stemmed auger fitted with a 2" split-spoon sampler. All sampling equipment was decontaminated between samples with a trisodium phosphate wash, water rinse, hexane wash and a triple rinse with distilled, deionized water. Auger flights were decontaminated by high pressure steam cleaning between bore holes.

Samples were obtained from two areas. Area 1 consisted of a peripheral surface margin surrounding the containment areas on all of the available sides (see Figure 1). Area 2 consisted of the area inside the containment wall. All samples from each site were placed in new 16-ounce wide-mouthed glass jars previously washed with laboratory cleaner, water rinsed, hexane washed, air dried and rinsed three times with distilled, deionized water, then fitted with teflon-lined caps under clean conditions. Samples were labelled with client identification, sample number, date, time, sampler's name, sample location, and other pertinent information. Containers were sealed and placed in portable, refrigerated ice chests for transportation to the laboratory. Samples were delivered to the laboratory by RES courier within 48 hours after collection. Chain of custody forms accompanied all samples from original field sampling to final analysis and are included in this report (Appendix A). A field log of each sample was generated on site during sampling and retained for future reference.

Preliminary surface sampling in Area 1 was performed by preparation of a composite sample obtained from sub-areas A, D and F by pooling grab samples taken with triers or spoons at 10-foot intervals, five feet away from the containment area.

Secondary surface sampling was conducted in Area 1 by obtaining individual grab samples using triers or spoons. The sample sites are numbered 1-81 and are indicated on Figure 1. Secondary samples were obtained in response to the detection of significant concentrations of PCP in preliminary composite samples from sub-areas A and D, above, and were used solely to estimate the limits of contamination beyond the containment area. As stated earlier, no attempt was made in this sampling and analytical protocol to determine average (mean) values of PCP contamination.

Sampling in Area 1, peripheral samples, was performed to ascertain the surface margins of the contaminated area. It was arbitrarily assumed that the area within the containment walls was contaminated with PCP and the peripheral margins of this area established as consisting of the warehouse south wall, the east and west concrete walls and the southern edge of a pipeline transecting the containment area as indicated in Figure 1. Three concentric, 10-foot-wide marginal strips were staked out surrounding this boundary and are indicated by broken lines in Figure 1. The 10 foot marginal strips were subdivided into areas A, B and C to the west, D, E and F to the south, and G, H, and I to the east (see Figure 1).

Sampling of Area 2, the containment area proper, was performed to evaluate PCP concentrations at the surface and at depth in subsoils to the saturated zone. Grab samples were obtained from a 2-foot x 2-inch split spoon sampler pressed through a 6-inch hollow-stem augered bore hole, and were placed in 16-ounce sample containers as previously described. Decontamination procedures, chain of custody, labelling and logging were identical to Area 1 samples. Auger flights were decontaminated at the completion of each coring to prevent cross contamination. Samples were taken at a maximum depth of 0, 2, 4, 7 and 12 feet below the surface elevation of the unexcavated portion of the containment area.

Due to the sloping contour of the containment area caused by the excavation, the surface elevation below grade was measured from a string line pulled tightly between two unexcavated surface points and spanning the sampling point. Elevation of sampling site surfaces below this grade line was measured using a rigid ruler and is shown in Table I. Data from this table was used to calculate the actual auger depth below the surface required to obtain the split spoon samples to align all samples in the same respective horizontal plane. This data is listed in Table II and indicates the actual depth drilled below the surface required to obtain a sample at the nominal depth listed (0, 2, 4, 7, or 12 feet). In cases where it was deemed practical, soil was hand excavated to the depth corresponding to the first sampling depth indicated and the sample obtained manually with a small trier or spoon.

The horizontal array of borings was selected to minimize the maximum distance from any given point in the sampling area to the nearest boring. To do this most effectively, a triangular grid was staked off. The array was based on a

triangle with an east-west base of 25 feet and a north-south height of 18 feet. The maximum distance from any point on the grid to the nearest sample point in this case is 13.34 feet as opposed to 14.14 feet for a standard 20-foot x 20-foot rectangular array. This selection allowed for the placement of additional wells just outside the containment wall without increased cost, thereby improving coverage with fewer sampling points (reference: Parkhurst, D.F., Optimal Sampling Geometry for Hazardous Waste Sites; Environmental Science & Technology, 18 No. 7, p. 521 [1984]). The triangular grid is indicated on Figure 1. Bore holes are indicated by the symbol "■" and are labeled with alpha symbols J-Z. A table of samples so obtained is given in Table III.

Following sampling, borings were sealed with bentonite grout in accordance with state well sealing standards under the direction of a registered geologist. Decontamination water, collected into tubs, was analyzed and, following receipt of negative results for PCP, disposed of on site.

### Results

Samples were analyzed by Coffee Laboratories, Portland, Oregon, using EPA SW-846 protocols. Soil samples were Soxhlet extracted using EPA protocol #3540. Procedure #8040 was utilized with electron capture quantification for PCP analysis. Results are expressed in milligrams of PCP per kilogram soil (ppm, dry weight). At sites where results could be expected to approach zero (based on results from adjacent sites), samples were held but not analyzed. The results are listed in Table IVA-E. Preliminary composite results are shown in Table IVF and confirm PCP contamination beyond the containment wall.

These tables list PCP concentrations at each sample site as well as the X and Y coordinates used to locate these sites on the plan drawing (Figure 1). These coordinates are tied to an arbitrary grid as shown on Figure 1. The northwest corner of the containment wall is located at coordinates X=76, Y=166 (76,166), for sake of reference. Each sampling depth is listed on a separate table. Copies of the laboratory reports are listed in Appendix B.

The coordinate data and concentration results were plotted using an interpolating contouring program (In-Situ Corp., Laramie WY). This package performs smoothed contouring of the data using a triangularization method and bivariate interpolation. Contours were generated from surface samples (regardless of elevation below grade) and 2-, 4-, 7- and 12-foot depths below grade. The contours are plotted on Figures 2A-E. These contour diagrams have been reduced and printed on mylar sheets in addition to the attached figures.

TABLE I

TIME OIL CO. - PORTLAND, OREGON

Depth of Boring Site Surface Sample Below Grade  
(Horiz. String Line)

<u>Boring</u>	<u>Depth</u>
J	0
K	6"
L	3'
M	0
N	0
O	0
P	1'8"
Q	2'6"
R	0
S	0
T	2'
U	0
V	0
W	0
X	2'
Y	3'
Z	0

TABLE II  
TIME OIL CO. - PORTLAND, OREGON

Actual Split-Spoon Sample Depths Below Grade

<u>Boring</u>	<u>Nominal Depth</u>				
	<u>0</u>	<u>2</u>	<u>4</u>	<u>7</u>	<u>12</u>
J	0	0-2'	2-4'	5-7'	10-12'
K	NA	0-1 1/2	1 1/2-3 1/2	4 1/2-6 1/2	9 1/2-11 1/2
L	NA	NA	Surf (11")	2-4'	7-9'
M	0	0-2'	2-4'	5-7'	10-12'
N	0	0-2'	2-4'	5-7'	10-12'
O	0	0-2'	2-4'	5-7'	10-12'
P	NA	Surf (4")	0-2'	3-5'	8-10'
Q	NA	NA	0-1 1/2	2 1/2-4 1/2	7 1/2-9 1/2
R	0	0-2'	2-4'	5-7'	10-12'
S	0	0-2'	2-4'	5-7'	10-12'
T	NA	Surf	0-2'	3-5'	8-10'
U	0	0-2'	2-4'	5-7'	10-12'
V	0	0-2'	2-4'	5-7'	10-12'
W	0	0-2'	2-4'	5-7'	10-12'
X	NA	Surf	0-2'	3-5'	8-10'
Y	NA	NA	Surf (11")	2-4'	7- 9'
Z	0	0-2'	2-4'	5-7'	10-12'

NOTE:

Actual depths indicate depth of bottom of split-spoon.

NA = Not available

Surf = Surface sample obtained by hand excavation at depth indicated in parentheses



TABLE III  
TIME OIL CO. - PORTLAND, OREGON  
Nominal Split-Spoon Sample Depths

<u>Boring</u>	<u>0</u> Surface	<u>2</u> 0-2'	<u>4</u> 2-4'	<u>7</u> 5-7'	<u>12</u> 10-12'
J	X	X	X	X	X
K	-	X	X	X	X
L	-	-	X	X	X
M	X	X	X	X	X
N	X	X	X	X	X
O	X	X	X	X	X
P	-	X	X	X	X
Q	-	-	X	X	X
R	X	X	X	X	X
S	X	X	X	X	X
T	-	X	X	X	X
U	X	X	X	X	X
V	X	X	X	X	X
W	X	X	X	X	X
X	-	X	X	X	X
Y	-	-	X	X	X
Z	X	X	X	X	X

NOTE: X = Sample  
 - = Not available due to excavation  
 ND = Not sampled due to presence of groundwater

TABLE IVA  
TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Surface Contour Data

Sample #	Coordinates		Concentration Mg/Kg	Core #	Coordinates		Concentration Mg/Kg
	X	Y			X	Y	
1	81	171	13500	J	142.5	161	1400
2	71	171	29	K	117.5	161	N/A
3	71	161	500	L	92.5	161	N/A
4	71	151	5450	M	67.5	161	4720
5	71	141	5560	N	155	143	4280
6	71	131	8760	O	130	143	3000
7	71	121	4870	P	105	143	N/A
8	71	111	92	Q	80	143	N/A
9	71	101	20	R	142.5	125	1712
10	81	181	16	S	117.5	125	522
11	71	181	7	T	92.5	125	123
12	61	181	9	U	67.5	125	26550
13	61	171	95	V	155	107	317
14	61	161	175	W	130	107	3385
15	61	151	18	X	105	107	N/A
16	61	141	229	Y	80	107	N/A
17	61	131	88	Z	80	179	21
18	61	121	6				
19	61	111	3				
20	61	101	2.5				
21	61	91	5.2				
37	81	95	857				
38	91	96	1130				
39	101	97	17				
40	111	98	3.5				
41	121	98	3.1				
42	131	99	3.2				
43	141	100	2.4				
44	151	100	1.8				
45	161	101	171				
46	71	84	3				
47	81	85	3.6				
48	91	86	6.1				
49	121	87	3.2				
50	131	88	1.5				
51	141	89	2.3				
52	151	90	1.7				
53	161	91	1.9				
54	171	92	1.2				

N/A = Not Available

TABLE IVB  
TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Two Foot Contour Data

Core #	Coordinates		Concentration Mg/Kg
	X	Y	
J	142.5	161	3
K	117.5	161	8.8
L	92.5	161	N/A
M	67.5	161	87*
N	155	143	3.1
O	130	143	59
P	105	143	16
Q	80	143	N/A
R	142.5	125	34
S	117.5	125	252
T	92.5	125	123
U	67.5	125	44
V	155	107	260
W	130	107	15
X	105	107	4.5
Y	80	107	N/A
Z	80	179	14*

N/A = Not Available

\* = Data points omitted from contouring  
program to reduce extrapolation error

TABLE IVC  
TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Four Foot Contour Data

<u>Core #</u>	<u>Coordinates</u>		<u>Concentration Mg/Kg</u>
	<u>X</u>	<u>Y</u>	
J	142.5	161	3.6
K	117.5	161	10.5
L	92.5	161	7200
M	67.5	161	22
N	155	143	238
O	130	143	23
P	105	143	15
Q	80	143	2205
R	142.5	125	50
S	117.5	125	184
T	92.5	125	534
U	67.5	125	55
V	155	107	380
W	130	107	8.1
X	105	107	1.3
Y	80	107	598
Z	80	179	2

TABLE IVD  
TIME OIL CO. - PORTLAND, OREGON  
Pentachlorophenol in Soil  
7 Foot Contour Data

CORE #	COORDINATES		CONCENTRATION mg/kg
	X	Y	
J	142.5	161	(NA)
K	117.5	161	3
L	92.5	161	8400
M	67.5	161	1
N	155	143	(NA)
O	130	143	13
P	105	143	130
Q	80	143	700
R	142.5	125	500
S	117.5	125	1130
T	92.5	125	75
U	67.5	125	5
V	155	107	1
W	130	107	1
X	105	107	1.9
Y	80	107	700
Z	80	179	7

TABLE IVE  
TIME OIL CO. - PORTLAND, OREGON

Pentachlorophenol in Soil

12 Foot Contour Data

CORE #	COORDINATES		CONCENTRATION mg/kg
	X	Y	
J	142.5	161	NA
K	117.5	161	2.3
L	92.5	161	2030
M	67.5	161	690
N	155	143	NA
O	130	143	38
P	105	143	450
Q	80	143	1150
R	142.5	125	1
S	117.5	125	217
T	92.5	125	90
U	67.5	125	NA
V	155	107	3.4
W	130	107	1.9
X	105	107	1.0
Y	80	107	720
Z	80	179	1.0

TABLE IVF

TIME OIL CO. - PORTLAND, OREGON  
PENTACHLOROPHENOL IN SOIL

Preliminary Surface Composites

<u>Area</u>	<u>PCP (mg/kg)</u>
A	660
D	860
G	17

The scale on the mylar prints is such that the contours are superimposable on Figure 1 (site plan). This allows for facile comparison of PCP concentration profiles at depth with surface features of the facility. A reference point on Figures 1 and 2(a-e) is located at (76,166) for ease of alignment.

### Conclusions

As seen in Tables IVA-E, PCP concentrations range from 1 ppm to 26,550 ppm. Two foci of contamination are seen at the surface. One is located at coordinates (83,168) in the northwest corner of the containment area. A second focus occurs just outside the containment wall to the west at coordinates (65,125). Additional minor contamination sites occur at the surface in various positions throughout the sample area; however, no prominent concentration peaks are evident. This may be due, in part, to the partial excavation mentioned previously or to vehicle traffic or other activity in this area.

No evidence of penetration of the "loading area" focus below 2 feet was observed. Note that the results of the 2-foot contouring fail to demonstrate a continuation of the foci found at the surface. This is due, in part, to the excavation which removed the 2-foot material and to the definition of surface samples as surface material regardless of relationship to elevation (i.e. surface samples are not equivalent to "0 foot" samples). This phenomenon is indicated by the lack of sample sites on the 2-foot contour at boring sites L, M, Q, Y and Z. The lack of high PCP concentrations at boring site U, 2-foot contour, implies that no significant penetration occurred at this site and that PCP contamination at this site is restricted to narrowly distributed but high concentration surface contamination.

Contours at 4, 7 and 12 feet indicate appreciable attenuation of PCP concentrations with increasing depth. The maximum concentration at 12 feet is 2030 ppm located at boring "L". Note that no samples were analyzed at boring sites "J" and "N" at 7- or 12-foot depths, since concentrations above these depths indicated that concentrations near zero could be expected. No sample was obtained at "U" due to loss of sample when groundwater was encountered.

The slight tendency of the PCP plume to tail off to the south implies that groundwater flux may be diffusing the plume in this direction. This conclusion can only be substantiated by hydrogeologic evaluations of the site, however.



The contaminant plume may be restricted at the surface by the presence of the warehouse foundation. This structure could be expected to prevent diffusion of the PCP plume to the north by presenting a physical barrier to contaminant migration. Identification of concentrations of PCP beneath the building on contour plots is a function of the contouring program and may not be indicative of actual plume morphology in this area.

#### Summary

Significant PCP concentrations were detected in soil at Time Oil Co.'s north Portland operation. Contamination was pronounced at two focal sites, one at the northwest corner of the containment area and one at the west side of the containment area. Surface concentrations ranged from 1.2 mg/kg to 26,500 mg/kg. Sampling at depth indicated significant PCP concentrations at the northwest focus descending to the saturated zone and approximately 8-12 feet. Concentrations at 12 feet ranged from 1.0 mg/kg to 2,030 mg/kg. Analytical data from surface, 2-, 4- 7- and 12-foot samples were contoured and plotted and may be related to an area plan drawing of the same scale.

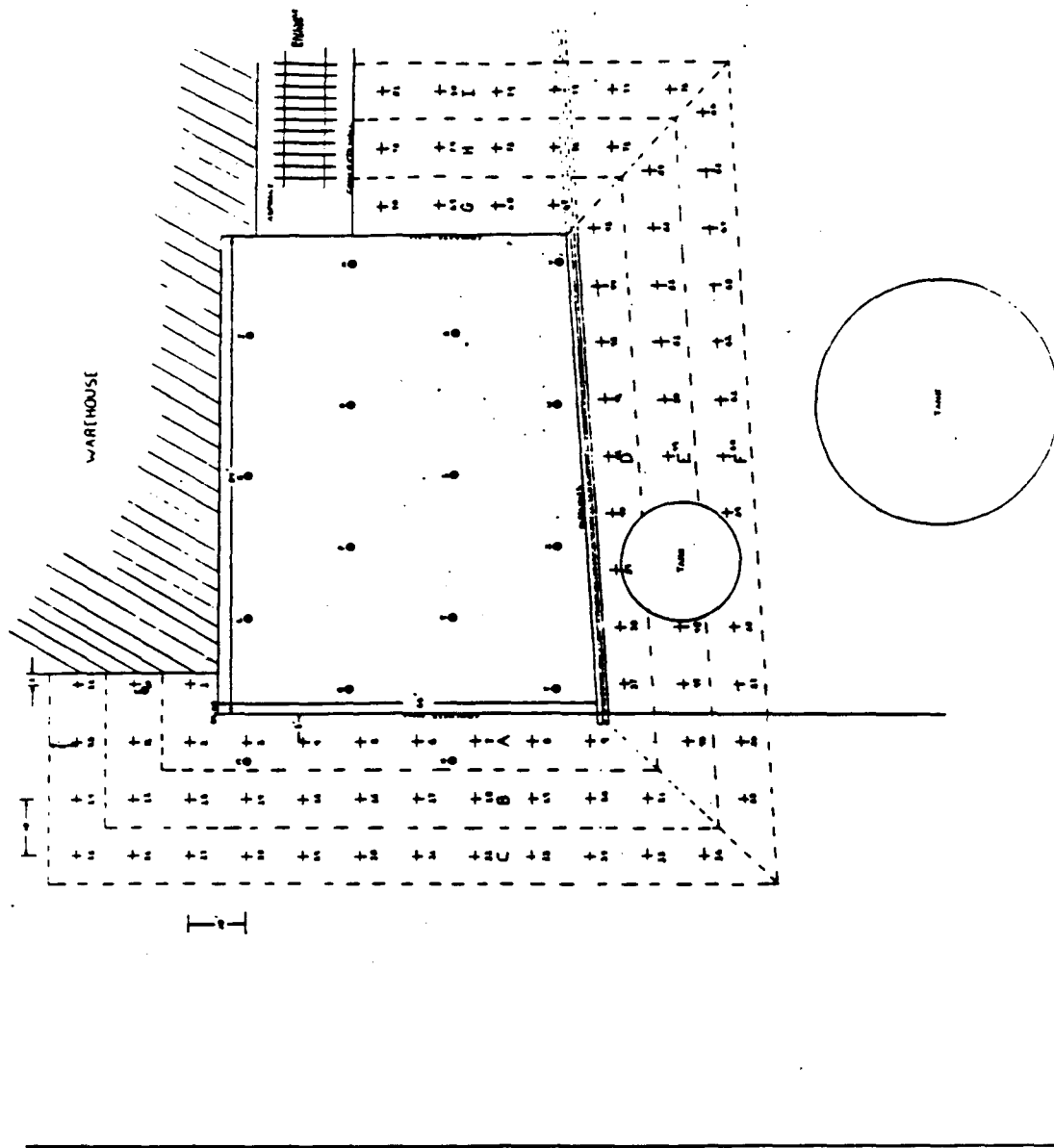
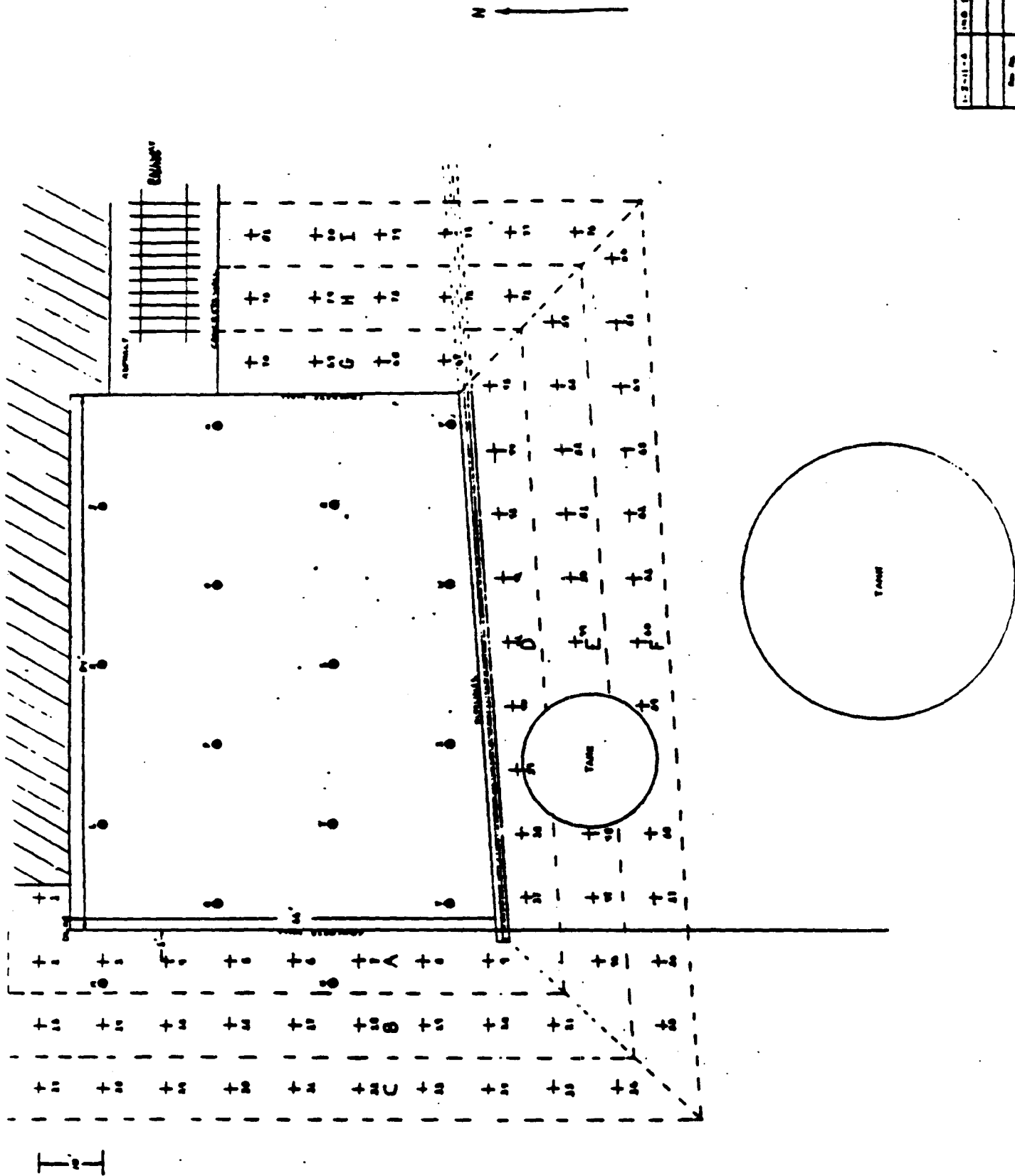


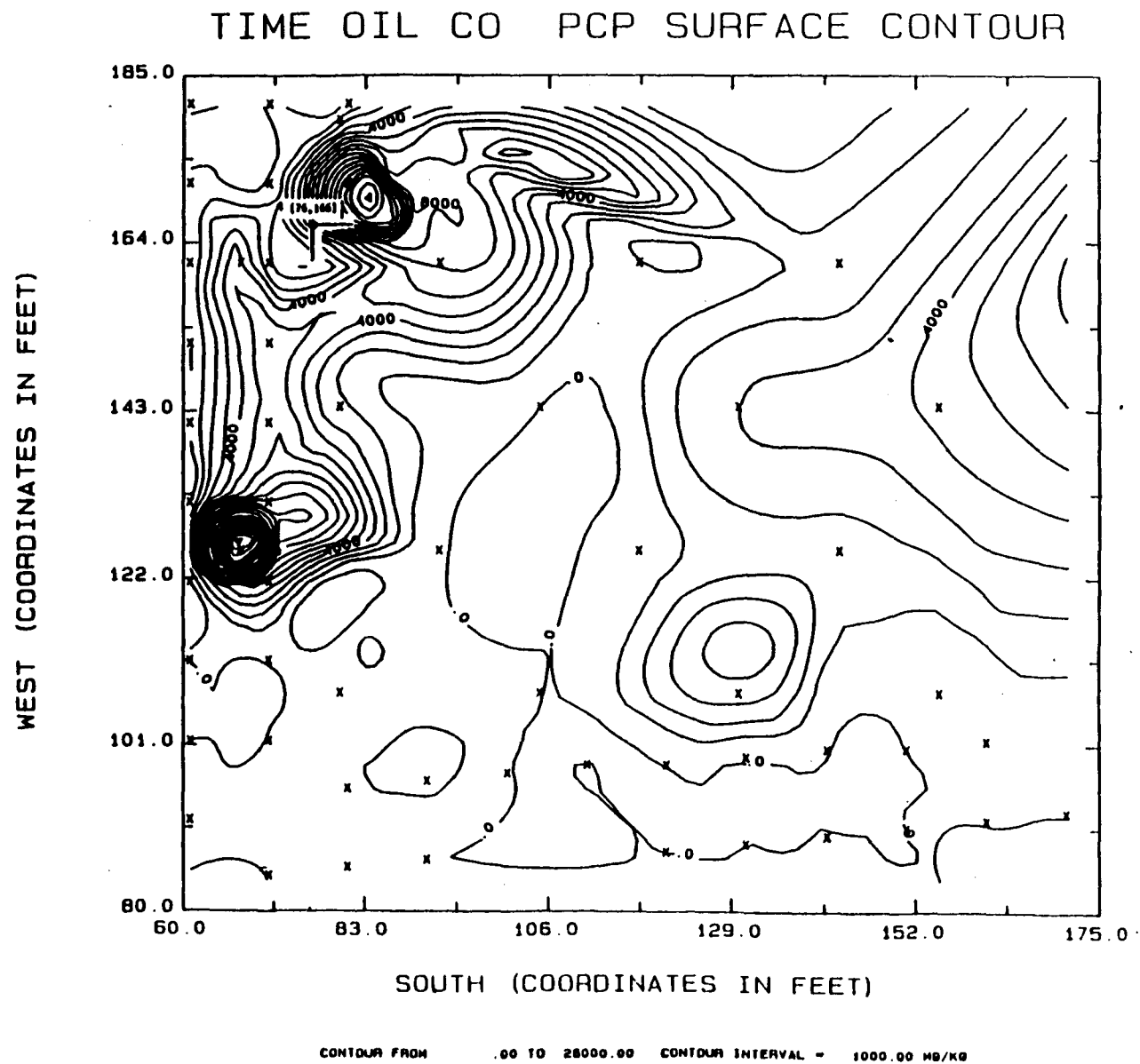
FIGURE 1



1-2-11-6	1-2-11-6	1-2-11-6	1-2-11-6	1-2-11-6

RIEDEL INTERNATIONAL

FIGURE 2A



BZTO104(e)011649

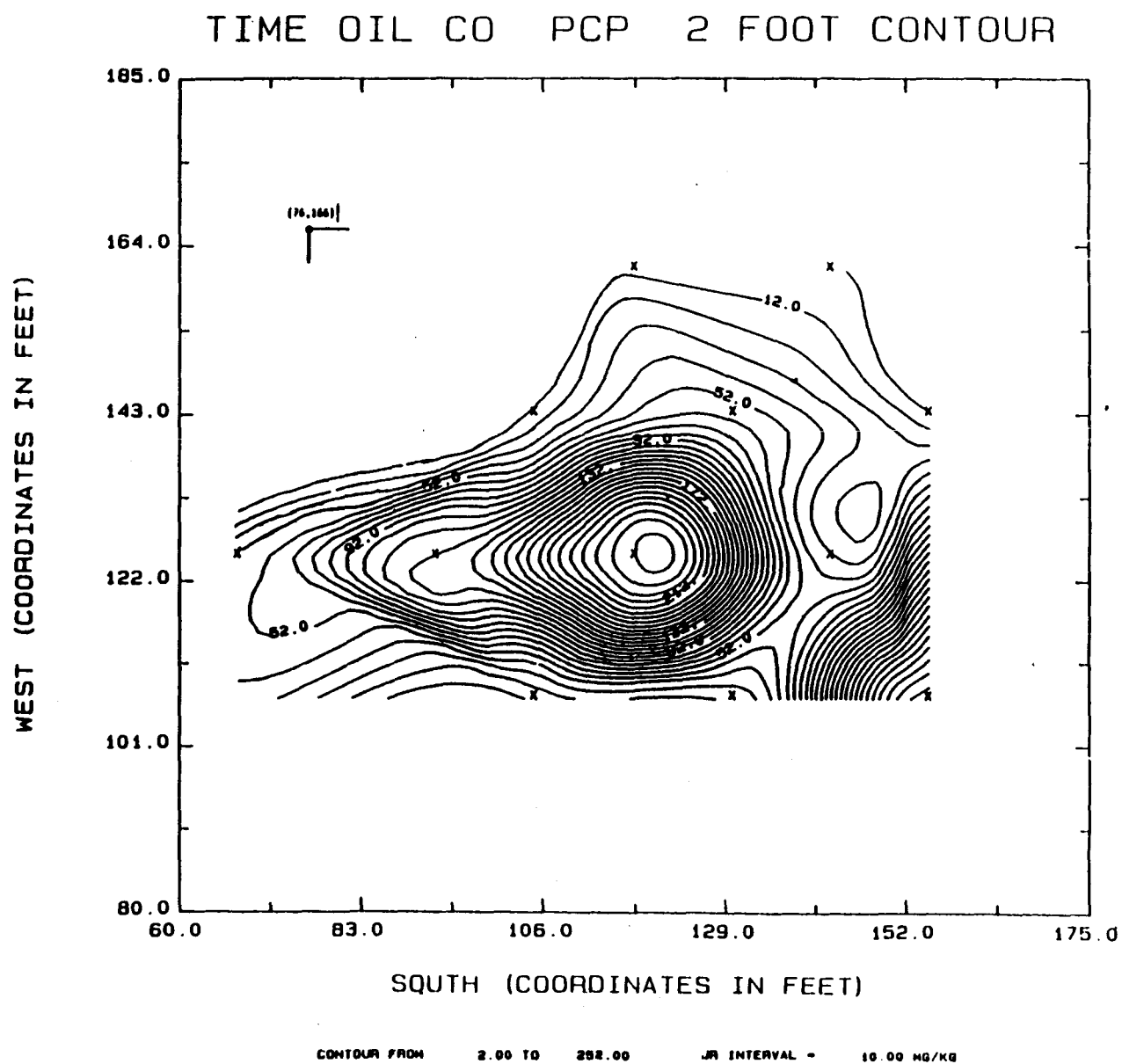


FIGURE 2C

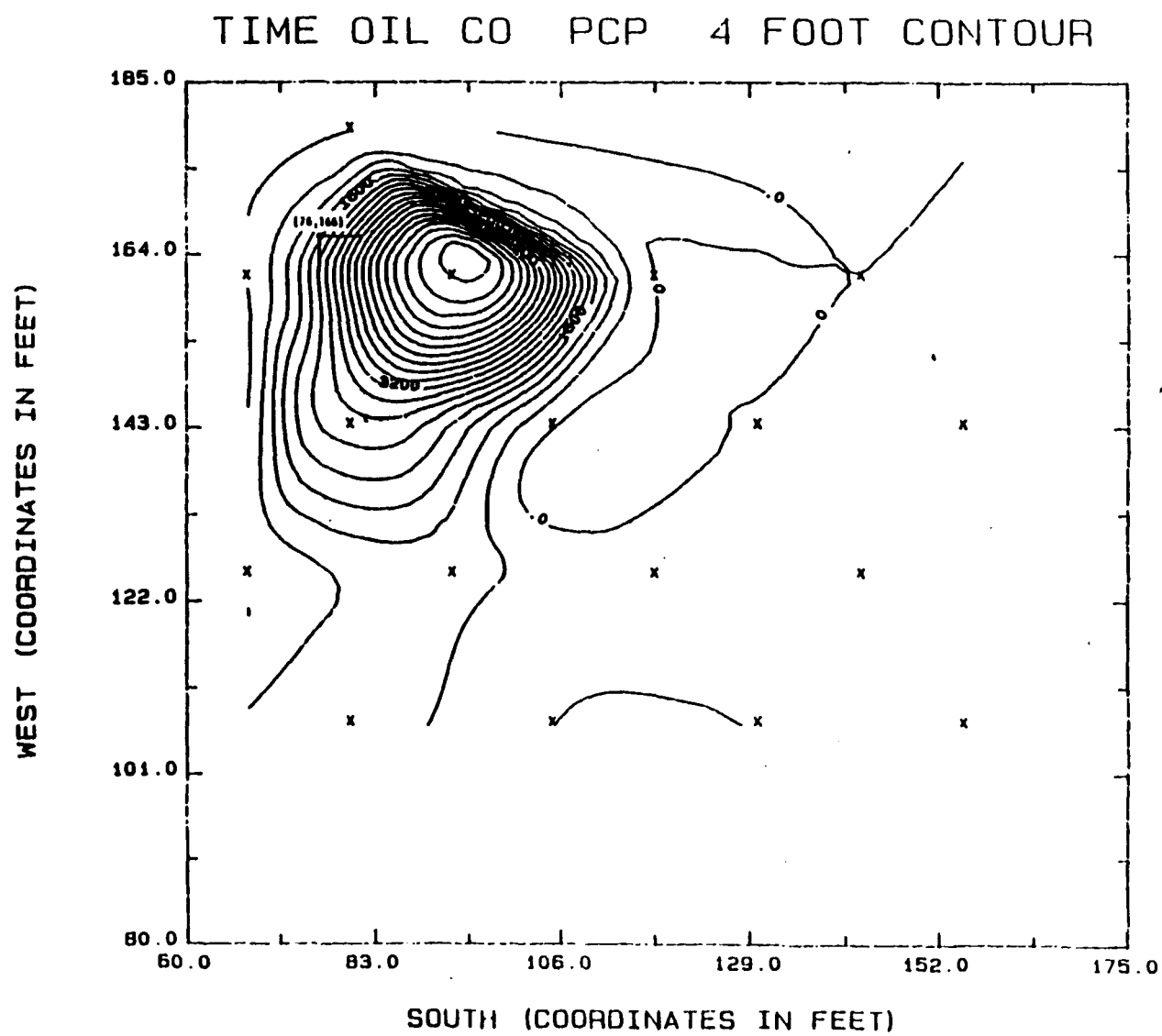


FIGURE 2 D

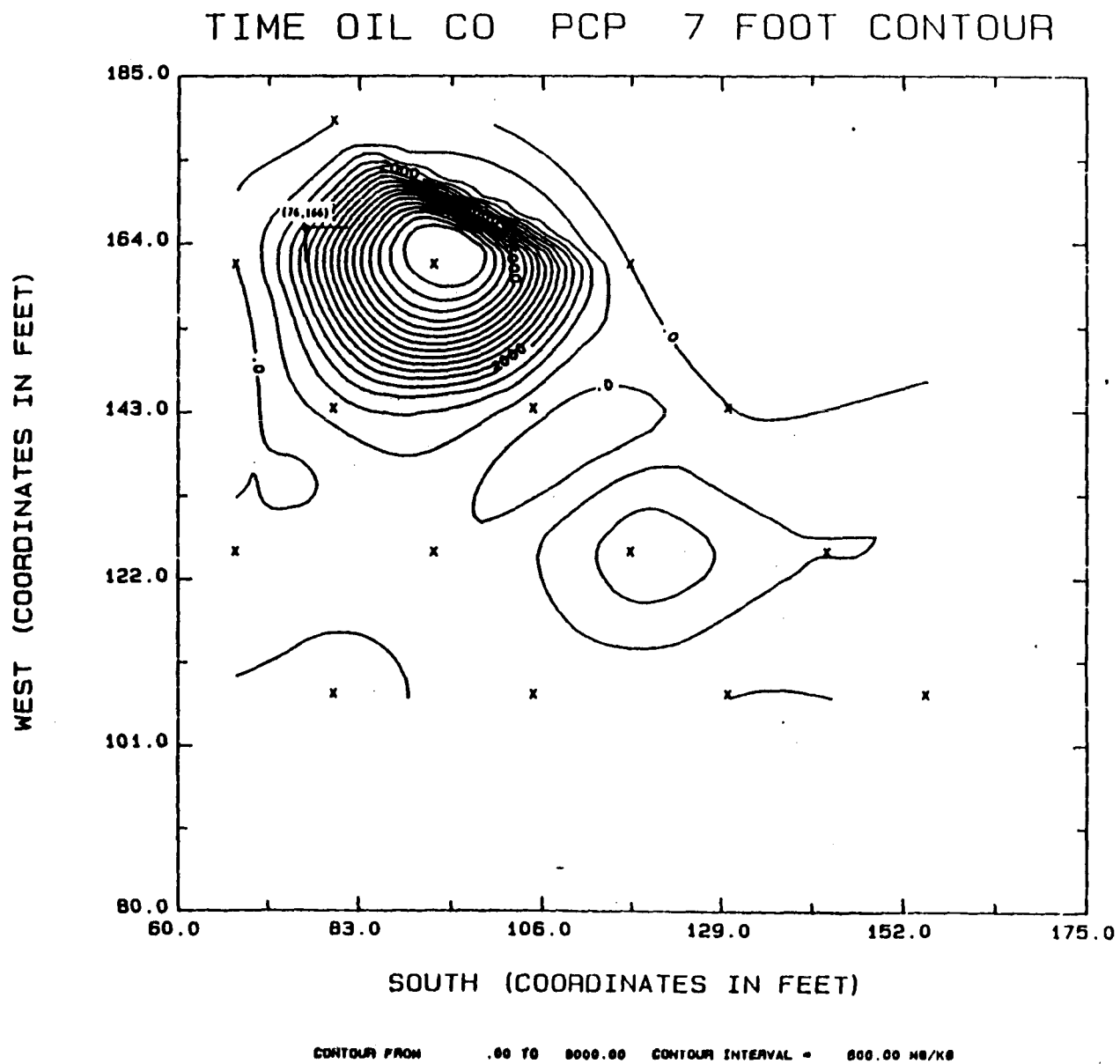
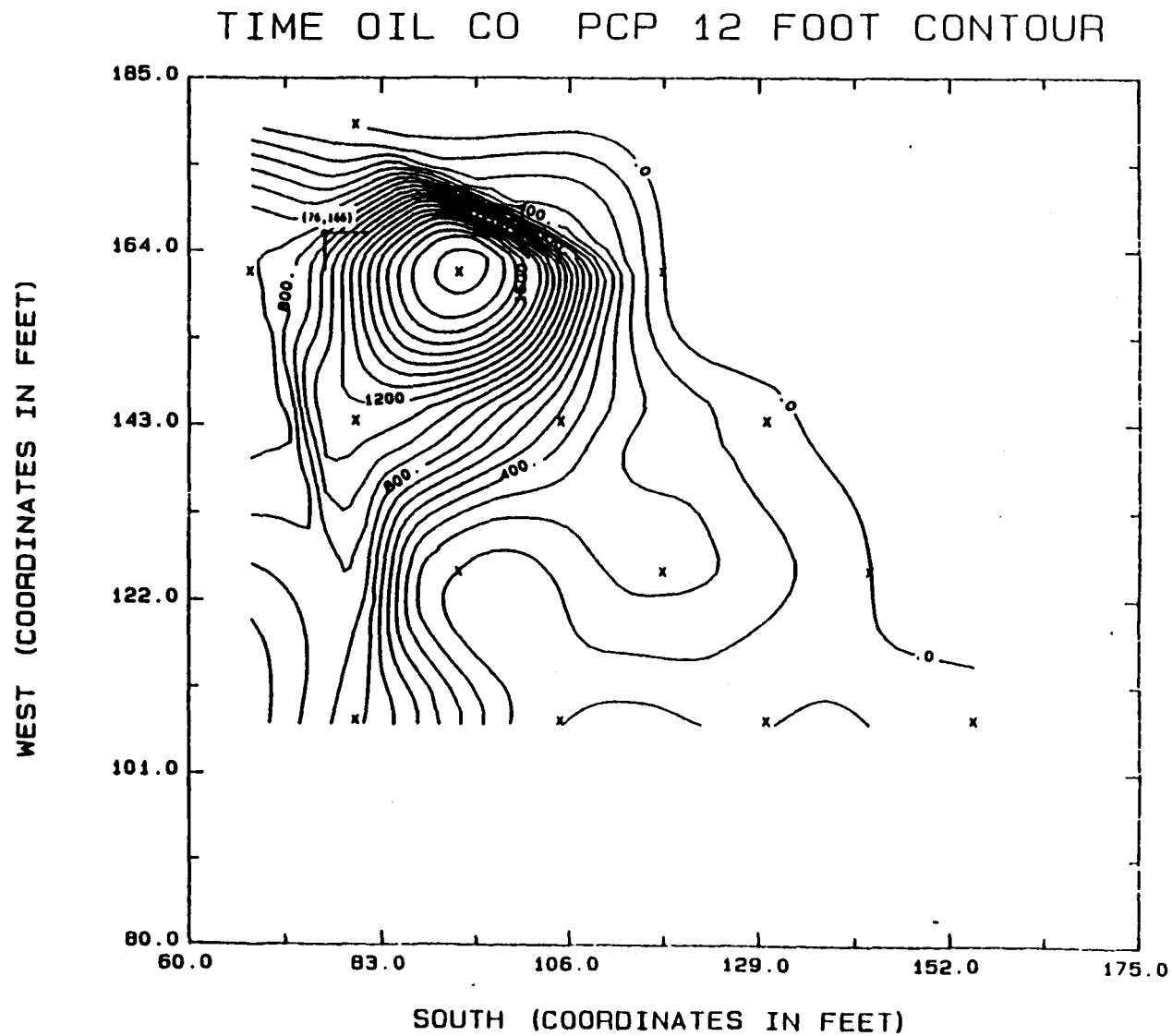


FIGURE 2E





**APPENDIX A**

**CHAIN OF CUSTODY RECORDS**

CHAIN OF CUSTODY RECORD

PROJ. NO. 5227		PROJECT NAME Tire Oil PCP Sampling		NO OF CONTAINERS		REMARKS	
SAMPLERS: (Signature)		STATION LOCATION					
STA. NO.	DATE	TIME	COM.	GRAS			
1	7/16	12:00			Area "A"		
2		12:02					
3		12:04					
4		12:06					
5		12:08					
6		12:10					
7		12:12					
8		12:14					
9		12:16					
10		12:18			Area "B"		
11		12:20					
12		12:22					
13		12:24					
14		12:26					
15		12:28					

Relinquished by: (Signature) J. H. Wallis	Date / Time 7/16/1549	Received by: (Signature) A. L. [Signature]	Relinquished by: (Signature) [Signature]	Date / Time 7-17-55/6:31	Received by: (Signature) Susan M. Coffey
Relinquished by: (Signature) Robert L. [Signature]	Date / Time 7/16 11716	Received by: (Signature) [Signature]	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) [Signature]	Date / Time 7/17 1925	Received by: (Signature) [Signature]	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator; Field Files

6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of-custody record.

3-0605

CHAIN OF CUSTODY RECORD

PROJ. NO. 73011		PROJECT NAME Toxicology Sampling		NO OF CONTAINERS		REMARKS
SAMPLED BY (Signature) Robert L. Keene						
STA. NO.	DATE	TIME	COM.	GRAB	STATION LOCATION	
16	7/16	12:40			Area B	
17		12:32				
18		12:34				
19		12:36				
20		12:38				
21		12:40				
22		12:42			Area C	
23		12:43				
24		12:44				
25		12:46				
26		12:48				
27		12:50				
28		12:52				
29		12:54				
30		12:56				

Relinquished by: (Signature) Heil Wallis	Date / Time 7/16/85 1547	Received by: (Signature) R. L. Keene	Relinquished by: (Signature) Scott	Date / Time 7-17-85 10:35	Received by: (Signature) Susan A. Gellon
Relinquished by: (Signature) R. L. Keene	Date / Time 7/16 1716	Received by: (Signature) Heil Wallis	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) Heil Wallis	Date / Time 7/17 0935	Received for Laboratory by: (Signature) Scott	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator; Field Files

6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of custody record.

3-0605

CHAIN OF CUSTODY RECORD

PROJ. NO. 8126 1004		PROJECT NAME Time 0:1 PCP Sampling		NO OF CON TAINERS		REMARKS									
SAMPLERS: (Signature) Robert Kenee															
STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION										
31	7/6	12:58			Area C										
32		13:00													
33		13:02													
34		13:04													
35		13:06													
36		13:08													
37		13:30			Area D										
38		13:32													
39		13:34													
40		13:36													
41		13:38													
42		13:40													
43		13:42													
44		13:44													
46		13:46													

Relinquished by: (Signature) Heidi Hollis	Date / Time 7/16/85 1549	Received by: (Signature) R. Kenee	Relinquished by: (Signature) D. C. P.	Date / Time 7-17-85 1035	Received by: (Signature) Susan M. Coffey
Relinquished by: (Signature) R. Kenee	Date / Time 7/16 1716	Received by: (Signature) John F. Rudolph	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) J. Rudolph	Date / Time 7/17 935	Received by: (Signature) D. C. P.	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field File

6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of-custody record.

3-0605

CHAIN OF CUSTODY RECORD

PROJ. NO. 8121 18011		PROJECT NAME Time Out - PCP Sampling		NO OF CON- TAINERS		REMARKS	
SAMPLERS: (Signature) Robert L. Kenee							
STA. NO.	DATE	TIME	COUNT	GRAB	STATION LOCATION		
46	7/16	13:48			Area E		
47		13:52					
48		13:52					
49		13:54					
50		13:56					
51		13:58			Area F		
52		14:00					
53		14:02					
54		14:04					
55		14:06					
56		14:08					
57		14:10					
58		14:12					
59		14:14					
60		14:16					

Relinquished by: (Signature) Heil Wallis	Date / Time 7/16/85 1549	Received by: (Signature) R. L. Kenee	Relinquished by: (Signature) Kenee	Date / Time 7-17-85 1635	Received by: (Signature) Simon M. C. [Signature]
Relinquished by: (Signature) R. L. Kenee	Date / Time 7/16 1716	Received by: (Signature) [Signature]	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature) [Signature]	Date / Time 7/17 0935	Received by: (Signature) [Signature]	Date / Time	Remarks	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6 / SAMPLING - Chain of Custody

3-0605

Figure 3. Example of chain-of custody record.

CHAIN OF CUSTODY RECORD

PROJ. NO. 8121		PROJECT NAME Tide Oil - PCP Sampling		NO OF CON TAINERS		REMARKS									
SAMPLERS: (Signature) Rabert L. Keene															
STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION										
61	7/16	14:18			Area F										
62		14:20													
63		14:22													
64		14:24													
65		14:26													
66		14:28													
67		14:30			Area G										
68		14:32													
69		14:34													
70		14:36													
71		14:38			Area H										
72		14:40													
73		14:42													
74		14:44													
75		14:46													
Relinquished by: (Signature) Hail Wallis			Date / Time 7/16/85 15:49		Received by: (Signature) R. L. Keene			Relinquished by: (Signature) Hail Wallis			Date / Time 7-17-85 1035		Received by: (Signature) Susan M. Gifford		
Relinquished by: (Signature) R. L. Keene			Date / Time 7/16 1716		Received by: (Signature) J. P. ...			Relinquished by: (Signature)			Date / Time		Received by: (Signature)		
Relinquished by: (Signature) J. P. ...			Date / Time 7/17 0935		Received by: (Signature) Hail Wallis			Date / Time			Remarks				

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6 / SAMPLING - Chain of Custody

3-0605

Figure 3. Example of chain-of-custody record.

### CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO OF CON- TAINERS	REMARKS	
SAMPLERS (Signature)						
STA. NO.	DATE	TIME	STATION LOCATION			
76	7/16	14:48	Area I			
77		14:50				
78		14:52				
79		14:54				
80		14:56				
81		15:00				
Relinquished by: (Signature)		Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
H. L. Keesee		7/16/85 1548	H. L. Keesee	W. J. Howell	7-17-85 1035	Susan M. Coffey
Relinquished by: (Signature)		Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
H. L. Keesee		7/16 1716	J. L. Keesee			
Relinquished by: (Signature)		Date / Time	Received by: (Signature)	Remarks		
J. L. Keesee		7/17 0935	W. J. Howell			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

## 6 / SAMPLING - Chain of Custody

BZTO104(e)011659

3-0605

Figure 3. Example of chain-of custody record.

ENVIRONMENTAL PROTECTION AGENCY  
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO. OF CONTAINERS		REMARKS									
3011		Time Oil													
SAMPLERS: (Signature)															
R. Schelich															
STA. NO.	DATE	TIME	COM.	GRAB	STATION LOCATION										
R-2	7-23	1555													
R-4	7-23	1600													
R-7	7-23	1610													
R-12	7-23	1620				light sample (not much) water 11'									
W-2	7-24	0800													
W-4	7-24	0810													
W-7	7-24	0820													
W-12	7-24	0830				water 11'									
S-2	7-24	0900													
S-4	7-24	0910													
S-7	7-24	0915													
S-12	7-24	0920				water 11'									
Relinquished by: (Signature)			Date / Time		Received by: (Signature)			Relinquished by: (Signature)			Date / Time		Received by: (Signature)		
R. Schelich			7-25/1000		JS										
Relinquished by: (Signature)			Date / Time		Received by: (Signature)			Relinquished by: (Signature)			Date / Time		Received by: (Signature)		
Relinquished by: (Signature)			Date / Time		Received for Laboratory by: (Signature)			Date / Time		Remarks					

Distribution: Original Accompanies Shipment; Copy to Coordinator Field File

6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of-custody record.

3-0605



CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO OF CONTAINERS		REMARKS									
3011		Time Oil													
SAMPLERS: (Signature)															
R Schelkin															
STA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION										
T-0	7-24					Not Avail. Below grade									
T-2	7-24	0930													
T-4	7-24	0935													
T-7	7-24	0945													
T-12	7-24	0955				Water approx 8 1/2'									
Y-4	7-24	1045													
Y-7	7-24	1050				Water approx 8 1/2' - 9'									
Y-12	7-24	1100													
X-2	7-24	1115													
X-4	7-24	1120													
X-7	7-24	1130													
X-12	7-24	1140													
Relinquished by: (Signature)			Date / Time		Received by: (Signature)			Relinquished by: (Signature)			Date / Time		Received by: (Signature)		
R Schelkin			7-25/1000		[Signature]										
Relinquished by: (Signature)			Date / Time		Received by: (Signature)			Relinquished by: (Signature)			Date / Time		Received by: (Signature)		
Relinquished by: (Signature)			Date / Time		Received for Laboratory by: (Signature)			Date / Time		Remarks					

Distribution: Original Accompanies Shipment; Copy to Coordinator Field File

6 / SAMPLING - Chain of Custody

3-0605

Figure 3. Example of chain-of-custody record.

## CHAIN OF CUSTODY RECORD

[illegible]

6 / SAMPLING - Chain of Custody

BZTO104(e)011662

Figure 3. Example of chain-of-custody record.

3-0605

CHAIN OF CUSTODY RECORD

PROJ. NO.		PROJECT NAME		NO OF CONTAINERS		REMARKS																	
3011		Time Oil																					
SAMPLERS: (Signature)																							
STA. NO.	DATE	TIME	COM.	GRAB	STATION LOCATION																		
P-2	7-24	1330																					
P-4	7-24	1405																					
P-7	7-24	1410																					
P-12	7-24	1420										water 10 1/2 - 11 ft.											
L-4	7-24	1325																					
L-7	7-24	1505																					
L-12	7-24	1505										water 3/4 sample 1210px 7 1/2 - 9"											
Q-4	7-24	1435										Sample appears wet											
Q-7	7-24	1435										Sample appears wet											
Q-12	7-24	1455										Water white - Sample -											
Relinquished by: (Signature)					Date / Time		Received by: (Signature)					Relinquished by: (Signature)					Date / Time		Received by: (Signature)				
R Schellin					7-25/1000		[Signature]																
Relinquished by: (Signature)					Date / Time		Received by: (Signature)					Relinquished by: (Signature)					Date / Time		Received by: (Signature)				
Relinquished by: (Signature)					Date / Time		Received for Laboratory by: (Signature)					Date / Time		Remarks									

Distribution: Original Accompanies Shipment; Copy to Coordinator; Field Files

6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of study record.

3 - 0605

## 6 / SAMPLING - Chain of Custody

2.- 0605

Figure 3. Example of chain-of-custody record.

## 6 / SAMPLING - Chain of Custody

3- 0605

Figure 3. Example of chain-custody record.

CHAIN OF CUSTODY RECORD

PROJ. NO. 3011		PROJECT NAME Time Oil		NO OF CON- TAINERS		REMARKS							
SAMPLERS: (Signature) R Schuelich													
STA. NO.	DATE	TIME	Down	Up	STATION LOCATION								
K-0	7-23	1405		X							NA Below Grade		
K-2	7-23	1415		X									
K-4	7-23	1420		X									
K-7	7-23	1425		X									
K-12	7-23	1435		X							Water Approx 11 1/2'		
Relinquished by: (Signature) R Schuelich			Date / Time 7-23-85 1500		Received by: (Signature) John Frantz			Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature)			Date / Time		Received by: (Signature)			Relinquished by: (Signature)		Date / Time		Received by: (Signature)	
Relinquished by: (Signature) John Frantz			Date / Time 7/23/85 1540		Received for Laboratory by: (Signature) R. Schuelich			Date / Time		Remarks			

Distribution: Original Accompanies Shipment; Copy to Coordinator Field File

6 / SAMPLING - Chain of Custody

3-- 0605

Figure 3. Example of chain-of-custody record.

### CHAIN OF CUSTODY RECORD

[illegible]

## 6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-custody record.

3- 0605

BZTO104(e)011667

## Office of Enforcement

### CHAIN OF CUSTODY RECORD

[illegible]

## 6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of-custody record.

3- 0605

BZTO104(e)011668



## CHAIN OF CUSTODY RECORD

[illegible]

## 6 / SAMPLING - Chain of Custody

Figure 3. Example of chain-of-custody record.

## CHAIN OF CUSTODY RECORD

## 6 / SAMPLING - Chain of Custody

## **APPENDIX B**

### **LABORATORY RESULTS**

# COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE.  
PORTLAND, OREGON 97230  
(503) 254-1794

RECEIVED

JUL 17 1985

Foot of North Portsmouth

July 17, 1985

Log #A850701-E

PRELIMINARY SURFACE SAMPLE

Fidel Environmental Services  
P. O. Box 3320  
Portland, Oregon 97023  
Attention: John Ruddick

Analyses Requested: Pentachlorophenol

SAMPLE ID	RESULTS
A-West Primary Lateral	660 mg/kg
B-South Primary Lateral	860 mg/kg
C-East Primary Lateral	17 mg/kg

Sincerely,

*Susan M. Coffey*  
Susan M. Coffey  
President

SNC:js

BZTO104(e)011672

# COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE.  
PORTLAND, OREGON 97230  
(503) 254-1794

RECEIVED

SEP 27 1985

Foot of North Portsmouth

July 25, 1985

Log #A850717-L

Riedel Environmental Services  
P.O. Box 3320  
Portland, Oregon 97023  
Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID			RESULTS			SAMPLE ID			RESULTS		
STATION	TIME		PCP mg/Kg			STATION	TIME		PCP mg/Kg		
-----	-----		-----			-----	-----		-----		
Area A						Area C					
1	12:00		13,500			23	12:43		Hold		
2	12:02		29			24	12:44		Hold		
3	12:04		500			25	12:46		Hold		
4	12:06		5,450			26	12:48		Hold		
5	12:08		5,560			27	12:50		Hold		
6	12:10		8,760			28	12:52		Hold		
7	12:12		4,870			29	12:54		Hold		
8	12:14		92			30	12:56		Hold		
9	12:16		20			31	12:58		Hold		
Area B						32	13:00		Hold		
10	12:18		16			33	13:02		Hold		
11	12:20		7			34	13:04		Hold		
12	12:22		9			35	13:06		Hold		
13	12:24		95			36	13:08		Hold		
14	12:26		175			37	13:30		957		
15	12:28		18			Area D					
16	12:30		229			38	13:32		1,130		
17	12:32		88			39	13:34		17		
18	12:34		6			40	13:36		3.5		
19	12:36		3			41	13:38		3.1		
20	12:38		2.5			42	13:40		3.2		
21	12:40		5.2			43	13:42		2.4		
						44	13:44		1.8		
						45	13:46		171		

THIS REPORT CONTINUES

BZTO104(e)011673

# COFFEY LABORATORIES, INC.

4914 N.E. 122ND AVE.  
PORTLAND, OREGON 97230  
(503) 254-1794

Riedel Environmental Services  
Page Two  
Attention: John Ruddick

July 25, 1985  
Log #A850717-L

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

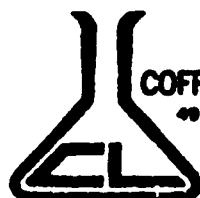
SAMPLE ID			RESULTS			SAMPLE ID			RESULTS		
STATION	TIME		PCP mg/Kg			STATION	TIME		PCP mg/Kg		
-----	-----		-----			-----	-----		-----		
Area E						Area G					
46	13:48		3.0			67	14:30		Hold		
47	13:50		3.6			68	14:32		Hold		
48	13:52		6.1			69	14:34		Hold		
49	13:54		3.2			70	14:36		Hold		
50	13:56		1.5			Area H					
51	13:58		2.3			71	14:38		Hold		
52	14:00		1.7			72	14:40		Hold		
53	14:02		1.9			73	14:42		Hold		
54	14:04		1.2			74	14:44		Hold		
Area F						75	14:46		Hold		
55	14:06		Hold			Area I					
56	14:08		Hold			76	14:48		Hold		
57	14:10		Hold			77	14:50		Hold		
58	14:12		Hold			78	14:52		Hold		
59	14:14		Hold			79	14:54		Hold		
60	14:16		Hold			80	14:56		Hold		
61	14:18		Hold			81	15:00		Hold		
62	14:20		Hold								
63	14:22		Hold								
64	14:24		Hold								
65	14:26		Hold								
66	14:28		Hold								

Sincerely,

Susan M. Coffey,  
President

SMC/gs

BZTO104(e)011674

**COFFEY LABORATORIES, INC.**

4914 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

July 30, 1985  
Log #A850723-I

Riedel Environmental Services  
P.O. Box 3320  
Portland, Oregon 97023  
Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID			RESULTS	SAMPLE ID			RESULTS
STATION	TIME	PCP mg/Kg		STATION	TIME	PCP mg/Kg	
S-0	1505	522		O-0	1445	2000	
R-0	1440	1712		O-2	1115	59	
W-0	1500	3385		O-4	1315	23	
Z-0	1505	21		O-7	1325	Hold	
Z-2	0820	14		O-12	1340	Hold	
Z-4	0830	2		J-0	1440	1400	
Z-7	0838	Hold		J-2	1035	3.1	
Z-12	0846	Hold		J-4	1040	3.6	
M-0	1500	4720		J-7	1045	Hold	
M-2	0720	87		J-12	1035	Hold	
M-4	0735	22		N-0	1430	4280	
M-7	0750	Hold		N-2	0950	3.1	
M-12	0800	Hold		N-4	1005	238	
K-0	1405	No Sample Taken		N-7	1015	Hold	
K-2	1415	3.8		N-12	1025	Hold	
K-4	1420	10.5		U-0	1420	23.550	
K-7	1425	Hold		U-2	1435	44	
K-12	1435	Hold		U-4	1445	55	
				U-7	1455	Hold	
				U-12	1515	Hold	
				U-17	1530	Hold	

Sincerely,

Susan M. Coffey,  
President

SMC/gjs



August 1, 1985  
Log #A850725-Z

Riedel Environmental Services  
P.O. Box 3320  
Portland, Oregon 97023  
Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP) Analysis of Soil Samples

Method: EPA SW 846 with Electron Capture Quantitation

SAMPLE ID			RESULTS	SAMPLE ID			RESULTS
STATION	TIME		PCP mg/Kg	STATION	TIME		PCP mg/Kg
-----	-----		-----	-----	-----		-----
P-2	1330		16	S-2	0900		252
P-4	1405		15	S-4	0910		124
P-7	1410		Hold	S-7	0915		Hold
P-12	1420		Hold	S-12	0920		Hold
L-4	1345		7200	T-0			No Sample
L-7	1505		Hold	T-2	0930		123
L-12	1515		Hold	T-4	0935		534
				T-7	0945		Hold
Q-4	1435		2205	T-12	0955		Hold
Q-7	1445		Hold				
Q-12	1455		Hold	Y-4	1045		592
R-2	1555		34	Y-7	1050		Hold
R-4	1600		50	Y-12	1100		Hold
R-7	1610		Hold	X-2	1115		4.5
R-12	1620		Hold	X-4	1120		1.3
				X-7	1130		Hold
W-2	0800		15	X-12	1140		Hold
W-4	0810		8.1				
W-7	0820		Hold	V-0	1605		217
W-12	0830		Hold	V-2	1620		260
				V-4	1625		380
Water Tub	0930		106 $\mu$ g/l	V-7	1645		Hold
				V-12	1650		Hold

Results in mg/Kg unless otherwise stated.

Sincerely,

*Susan M. Coffey*  
Susan M. Coffey,  
President

SMC/gs





COFFEY LABORATORIES, INC.

4914 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

RECEIVED

SEP 27 1985

Foot of North Portsmouth

August 27, 1985  
Log #A850813-F

Riedel Environmental Services  
P. O. Box 5007  
Portland, Oregon 97208  
Attention: John Ruddick

Sample ID: Time Oil

Sample Description: Soil

Analysis Requested: Pentachlorophenol

SAMPLE NUMBER	PENTACHLOROPHENOL
-----	-----
K-7	3
L-7	8,400
M-7	< 1.0
O-7	13
P-7	150
Q-7	700
S-7	1,130
T-7	75
U-7	5
Y-7	700
Z-7	7

Results in mg/Kg

\ denotes "less than"

Sincerely,

Susan M. Coffey,  
President

SMC/db

BZTO104(e)011677



**COFFEY LABORATORIES, INC.**

4914 N.E. 122nd Ave.  
Portland, OR 97230  
Phone: (503) 254-1794

September 5, 1985  
Log #A850723-Q

Riedel Environmental Services  
P.O. Box 5007  
Portland, Oregon 97208

Attention: John Ruddick

Analysis Requested: Pentachlorophenol (PCP)

Sample Description: Time-Oil Site

SAMPLE ID	PCP
-----	-----
R7	500
V7	1.0
W7	< 1.0, < 1
X7	1.9
K12	2.3
L12	2030
M12	690
O12	38
P12	450
Q12	1150
R12	< 1
S12	212, 222 $\bar{x} = 217$
T12	90
V12	3.4
W12	1.9
X12	1.0
Y12	720
Z12	1.0

< denotes "less than"

Results in mg/Kg

Sincerely,

*Susan M. Coffey*  
Susan M. Coffey  
President

SMC/gs

TIME OIL CO.  
ECOVA VOL. III (DEC. 1991)

**PRELIMINARY ASSESSMENT / DATA EVALUATION  
AND PROPOSED REMEDIATION PLAN  
FOR PENTACHLOROPHENOL CONTAMINATED SOIL AT:**

**TIME OIL CO.**

**NORTHWEST TERMINAL  
12005 NORTH BURGARD ROAD  
PORTLAND, OREGON**

**VOLUME III - WORK PLAN**

**ECOVA Corporation  
18640 NE 67th Court  
Redmond, WA 98052**

**Project No. 1067**

**December, 1991**

**ECOVA**



**Work Plan  
for  
Soil and Groundwater Remediation  
Time Oil Northwest Terminal  
Portland, Oregon**

**to**

**TIME OIL COMPANY**

**Submitted by:**

**ECOVA CORPORATION  
3820 159th Avenue NE  
Redmond, Washington 98052  
Project Number: 821401**

**September 12, 1988**

### **NONDISCLOSURE STATEMENT**

The following information, furnished in connection with the Preliminary Work Plan for Soil and Groundwater Remediation, Time Oil Northwest Terminal, Portland, Oregon, specifically identified in Section 2.2 - Conceptual Engineering Design, 4 - Project Costs, Appendix C - Ecova PCP Research, and Appendix D - Analytical Data Report of this Work Plan, constitutes trade secrets or confidential commercial and financial information which the Offeror believes to be exempt from disclosure. The Offeror requests that this information not be disclosed to the public, except as may be required by law. The Offeror requests that this information not be used in whole or part by Time Oil for any purpose other than to evaluate the Work Plan, except that if a contract is awarded to the Offeror as a result of or in connection with the submission of the Work Plan, Time Oil shall have the right to use the information to the extent provided in the contract.

## TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION .....	1-1
1.1 Site Background .....	1-1
1.2 Site Characteristics .....	1-1
2. SCOPE OF WORK .....	2-1
2.1 Overview .....	2-1
2.2 Conceptual Engineering Design .....	2-3
2.3 Work Program .....	2-10
3. SCHEDULE .....	3-1
4. PROJECT COSTS .....	4-1
5. PROJECT MANAGEMENT .....	5-1
5.1 Project Organization and Personnel .....	5-1
5.2 Support Services .....	5-3
6. EXPERIENCE .....	6-1
6.1 Technology Development and Capabilities .....	6-1
6.2 References .....	6-2

## APPENDIXES

APPENDIX A. Soil Boring Analysis .....	A-1
APPENDIX B. Resumes .....	B-1
APPENDIX C. Ecova PCP Research .....	C-1
APPENDIX D. Analytical Data Report .....	D-1
APPENDIX E. Treatment Study Report .....	E-1

## TABLES

TABLE 1-1. Pentachlorophenol (PCP) Concentrations in Soil Samples .....	1-3
TABLE 2-1. Design Basis Parameters For Soil Bioslurry Treatment System Time Oil Company .....	2-3
TABLE 4-1. Project Costs for Cleanup Levels .....	4-1

## FIGURES

FIGURE 1-1. Site Layout - Time Oil Company .....	1-2
FIGURE 2-1. Work Breakdown Structure .....	2-2
FIGURE 2-2. Block Flow Diagram .....	2-4
FIGURE 2-3. Process Flow Diagram .....	2-5
FIGURE 5-1. Project Organization .....	5-2
FIGURE A-1. Excavation Plan 0 - 2' Depth .....	A-3
FIGURE A-2. Excavation Plan 2 - 5 1/2' Depth .....	A-4
FIGURE A-3. Excavation Plan 5 1/2 - 9 1/2' Depth .....	A-5
FIGURE A-4. Excavation Plan 9 1/2 - 12' Depth .....	A-6

## **1. INTRODUCTION**

Ecova Corporation was retained by Time Oil Company to develop a Preliminary Work Plan for remediating soil and groundwater contaminated with pentachlorophenol (PCP) at its "Northwest Terminal" in Portland, Oregon. This work plan outlines the approach that Ecova proposes to follow in conducting the work, including design and installation of the slurry/liquid treatment facilities, biodegradation of PCP contamination, dewatering of the slurries after treatment, and final disposal of treated soil and groundwater. The work plan also addresses Ecova's participation in support of regulatory agency approval of the remediation plan. Included in this work plan are descriptions of the individual tasks to be performed, the management team assigned to carry out the project activities (Section 3.0), the project schedule showing task duration and milestones (Section 4.0), and the project costs provided in Section 5.0.

### **1.1 SITE BACKGROUND**

Time Oil operates a petroleum products terminal in Portland, Oregon, that provides tank storage facilities for its products as well as custom storage for outside customers. Until recently, Time Oil also operated a PCP mixing facility at the Northwest Terminal to produce products for a woodtreating chemicals manufacturing and distributing firm. Operations included melting blocks of virgin PCP, mixing with mineral spirits, and repackaging the mixture for shipment. Operations were discontinued at the plant several years ago.

During the time of plant operation, soils beneath and nearby the processing units became contaminated with the PCP product, especially around the drum or tank loading area near the woodtreating chemicals warehouse. Since the decommissioning of the plant, all of the PCP processing units have been removed.

Time Oil has conducted a number of investigations of the extent of PCP contamination in the soils surrounding the facility and in downgradient groundwater. As a result of their confirmation of the presence of PCP in these media, Time Oil retained Ecova to study the information available and to develop this preliminary work plan for cleanup actions. At present, there is no active enforcement action being taken relative to the site by any regulatory agency.

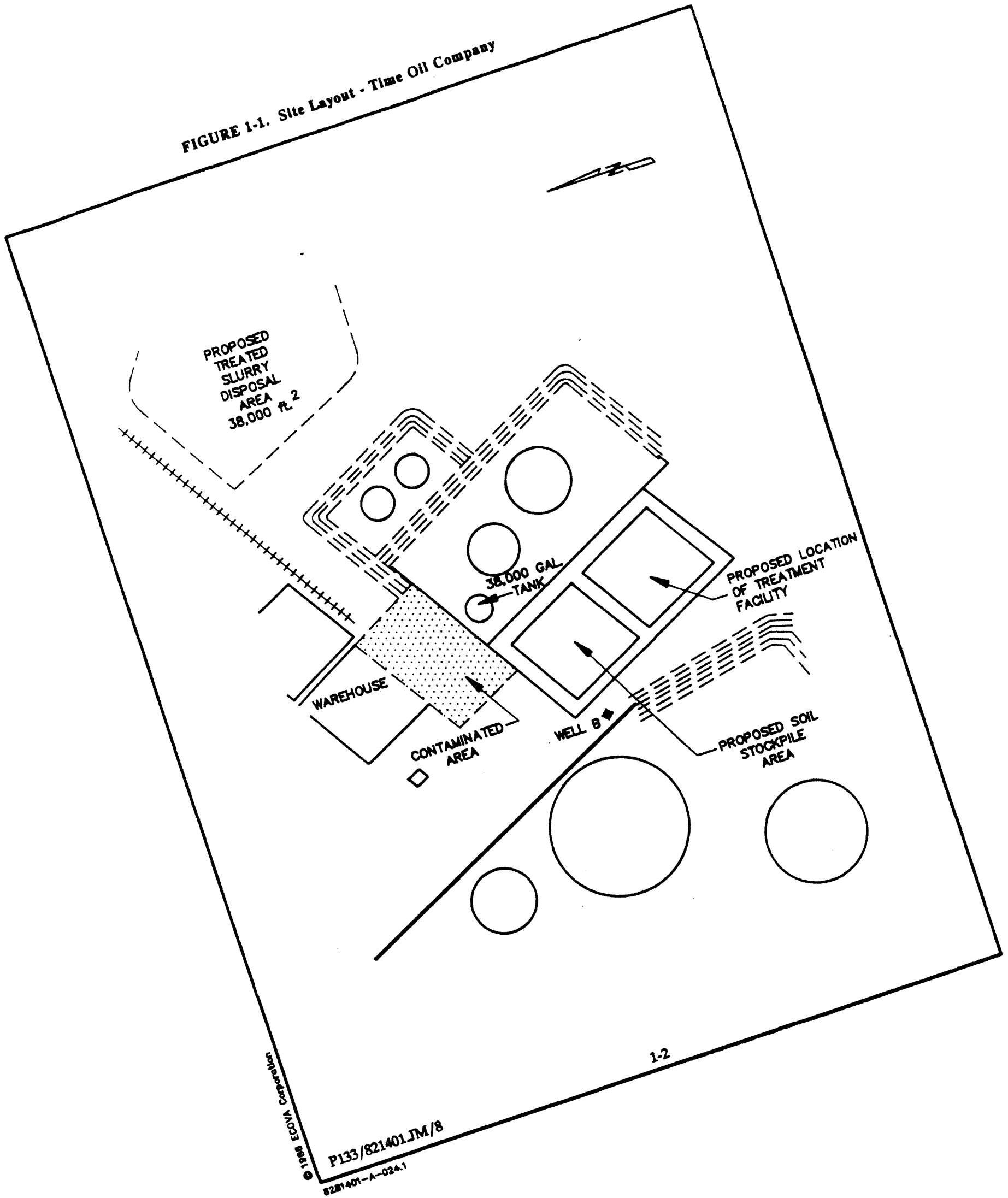
### **1.2 SITE CHARACTERISTICS**

The site is located on the northern bank of the Willamette River, in the city of Portland, Oregon. The layout of the site is illustrated in Figure 1-1, Site Layout. Time Oil has identified approximately 2,700 cubic yards of soil with PCP contamination exceeding 500 ppm. From information provided by Time Oil, concentrations of PCP have ranged to 8400 ppm in the soil around the loadout area near the southern corner of the warehouse for the plant. Concentrations declined rapidly a few feet away from the "hot spot", generally decreasing to concentrations of under 1500 ppm which is approximately the average concentration reported by Time Oil.

Soil type is generally mixed sands, silts and gravels normally associated with a former river channel environment. Little clay appears to be present near the surface, although lenses may occur at depth. With little clay present, the PCP tends to be mobile, migrating downward into the soil vadose zone and entering the groundwater underlying the site, some 18 to 20 ft below ground level.



FIGURE 1-1. Site Layout - Time Oil Company



As a confirmation of the levels of PCP in the site soils, Ecova conducted a sampling of the pile on July 29, 1988. Analyses of these samples were conducted by Ecova Analytical Services (EAS). The results of these analyses are presented in Table 1-1. These data confirm the levels of PCP reported by Time Oil and also confirm that there are significant variations in PCP concentrations within the pile of contaminated soil.

A background soil sample was collected from the site as a check for background concentrations of PCP. This soil sample was a composite collected from several locations around the terminal property. The analysis of the sample suggests that it is representative of PCP concentrations in soils surrounding the site. A sample of groundwater was taken from Well B at the site which did not show PCP contamination. However, analytical problems relating to poor spike and surrogate recoveries indicate a need to re-extract and reanalyze.

**TABLE 1-1. Pentachlorophenol (PCP) Concentrations in Soil Samples**

<u>Sample</u>	<u>Concentration (ppm)</u>
W-1	250
E-1	2000
S-1	2.2
N-1	720
Composite	680
<hr/>	
Background	0.131

In addition to the sampling data, other information on PCP was examined. Time Oil has provided Ecova with exceptionally detailed in-house soil boring and groundwater data indicating the distribution of PCP in the soils around the site. Ecova has reviewed this information carefully to determine the following:

- 1) The volume of soil to be excavated
- 2) The approach for conducting the excavation
- 3) The average PCP concentration in the excavated soil.

The results of this investigation, included in Appendix A, Soil Boring Analysis, indicate that approximately 3440 bank cubic yards of soil, containing an average of 668 ppm of PCP would have to be removed. Soil within each soil horizon sampled that will need to be excavated is illustrated on the PCP concentration plots given in Appendix illustrations A-1 through A-4. The average concentration of 668 ppm is consistent with the composite sample shown in Table 1-1. This data will be included in the system design basis parameters presented in Section 2.2, Conceptual Engineering Design.

Since the soil boring study was conducted, Time Oil has had earthmoving equipment push the surface contaminated soils into a pile over the hot spot in the approximate center of the former plant site. This resulted in covering the most contaminated soils while achieving a degree of mixing of the

different contamination levels. While the boring data and excavation approach outlined in Appendix A do not reflect the current location of contaminated soil at the surface or ground level, the data is taken to be representative of PCP contamination distribution at depth.

## **2. SCOPE OF WORK**

### **2.1 OVERVIEW**

Ecova has developed a remediation program incorporating physical, chemical, and biological treatment technologies aimed at eliminating the PCP contaminants in the soil and groundwater. Contaminants will be separated from the soil media and biodegraded in solution to complete mineralization until the target levels are achieved.

The goal of this program has been to develop a cost-effective remediation strategy based upon biological degradation technologies which will reduce the PCP concentration to the levels acceptable to the appropriate regulatory agency, which is assumed to be Oregon Department of Environmental Quality (ODEQ). The program has been developed considering the following objectives:

- o Optimize the chemical and biological degradation of the PCP through use of soil slurry technologies;
- o Develop flexible remediation options that can treat both contaminated soil and groundwater;
- o Minimize the potential for migration of contaminants beyond the treatment area;
- o Develop options that can be implemented and completed in timely manner.
- o Use, to the extent practicable, Time Oil resources available on-site;

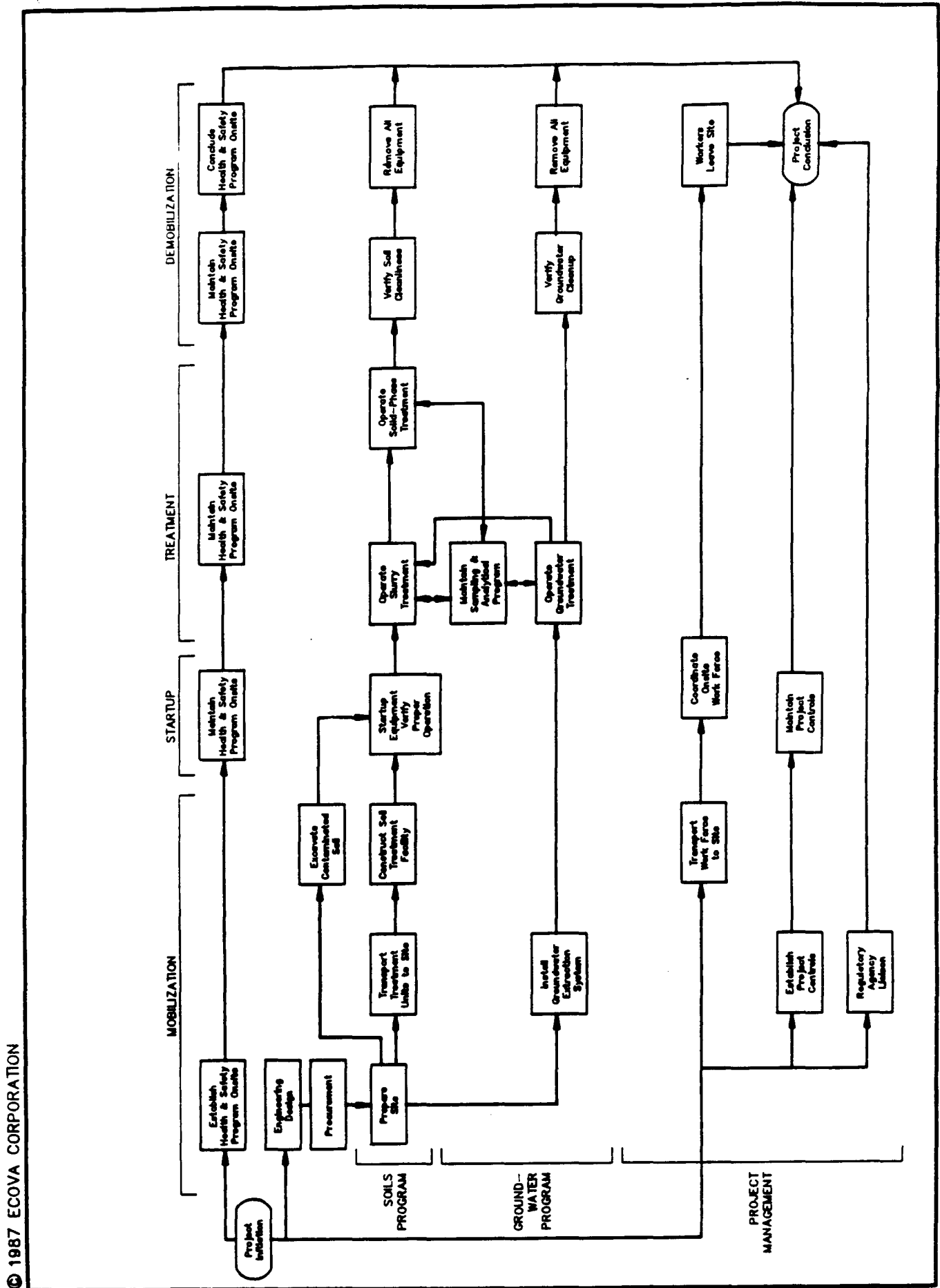
The proposed treatment program is conceptually illustrated in Figure 2-1, Work Breakdown Structure. As shown in this figure, work on the project will commence immediately upon receiving authorization to proceed. Work will start with the engineering design and procurement of equipment needed for remediation. Time Oil will secure approval of the treatment program by ODEQ. Ecova will support Time Oil in its negotiations with ODEQ as directed by Time Oil's project manager and outlined in Section 2.3.2, Regulatory Authorization.

Following completion of the engineering of the treatment system and regulatory authorization, Ecova will mobilize to the Portland site and commence construction activities. While the treatment system is being constructed, the contaminated soil will be completely excavated and stockpiled on a plastic liner. The excavation will then be filled with borrow material obtained from the land treatment area.

Upon completion of construction of all of the treatment facilities, the treatment system will be operated on a batch basis until the stockpiled soil has been fully treated. Groundwater will be pumped by the groundwater extraction system and treated at the plant until the negotiated target cleanup concentrations have been reached. With completion of all treatment operations, the system will be decommissioned and the site cleaned of any remaining trash and debris. Removal of the treatment equipment units will proceed as discussed in Section 2.3.7, Demobilization.

As shown in Figure 2-1, an onsite worker health and safety program will be implemented and conducted throughout the remediation program.

FIGURE 2-1. Work Breakdown Structure



The conceptual engineering design of the treatment system proposed for the remediation project is discussed below, followed by a detailed discussion of each task in the program.

## 2.2 CONCEPTUAL ENGINEERING DESIGN

Ecova has prepared a conceptual engineering design which fulfills the program objectives discussed in the overview. Figures 2-2, Block Flow Diagram, and 2-3, Process Flow Diagram, illustrate this design for the onsite treatment system at the Time Oil Northwest Terminal site for complete remediation of the PCP contamination present in soils and groundwater.

Initial design parameters were determined from the data provided by Time Oil and Ecova treatability test results as presented in Appendixes A, B, C, and D. A summary of the primary design parameters is detailed in Table 2-1.

**TABLE 2-1. Design Basis Parameters For Soil Bioslurry Treatment System Time Oil Company**

### Assumed Parameters

Contaminated Soil to be Treated:	3440 cubic yards
Percentage Oversize (20 mesh):	15%
Average PCP Concentration:	680 ppm, dry soil
Slurry Solids Percentage:	35%
Contaminant Half Life:	1.4 days
Slurry Tank Volume (2 units):	50,000 gallons
Number of Batches:	32
Soil Treated Per Batch Cycle:	108 cu.yd.
Mixer Horsepower Requirements:	1.0 hp/1000 gals
Solid Phase Treatment/Disposal Area Size:	8,000 square feet
Depth of Solid Phase:	2.5 feet

<u>Derived Parameters</u>	<u>Target Cleanup Criteria (PCP Concentration in Dry Soil)</u>		
	<u>500 ppm</u>	<u>100 ppm</u>	<u>50 ppm</u>
Reactor Retention Time:	0.6 days	3.9 days	5.3 days
Batch Cycle Time:	Continuous	5.0 days	7.0 days
Approx. Treatment Duration:	46 days	160 days	224 days

As discussed in the Introduction a composite PCP concentration of 680 ppm was obtained from the July samples obtained by Ecova from the site. In examining the soil boring data and interpretation provided by Time Oil, we conclude that this concentration is approximately equal to the average concentration that would be obtained from a blended feedstock made up from stockpiled soil following the plan shown in Appendix A, Soil Boring Analysis. The average concentration is the key parameter in the design basis since this value determines the feed rate to and residence time in the bioreactors. The quantity of contaminated soil present determines the capacity of bioreactor needed, the length of time needed for treatment given the average concentration and degradation rate, and the size of land treatment/disposal area needed.

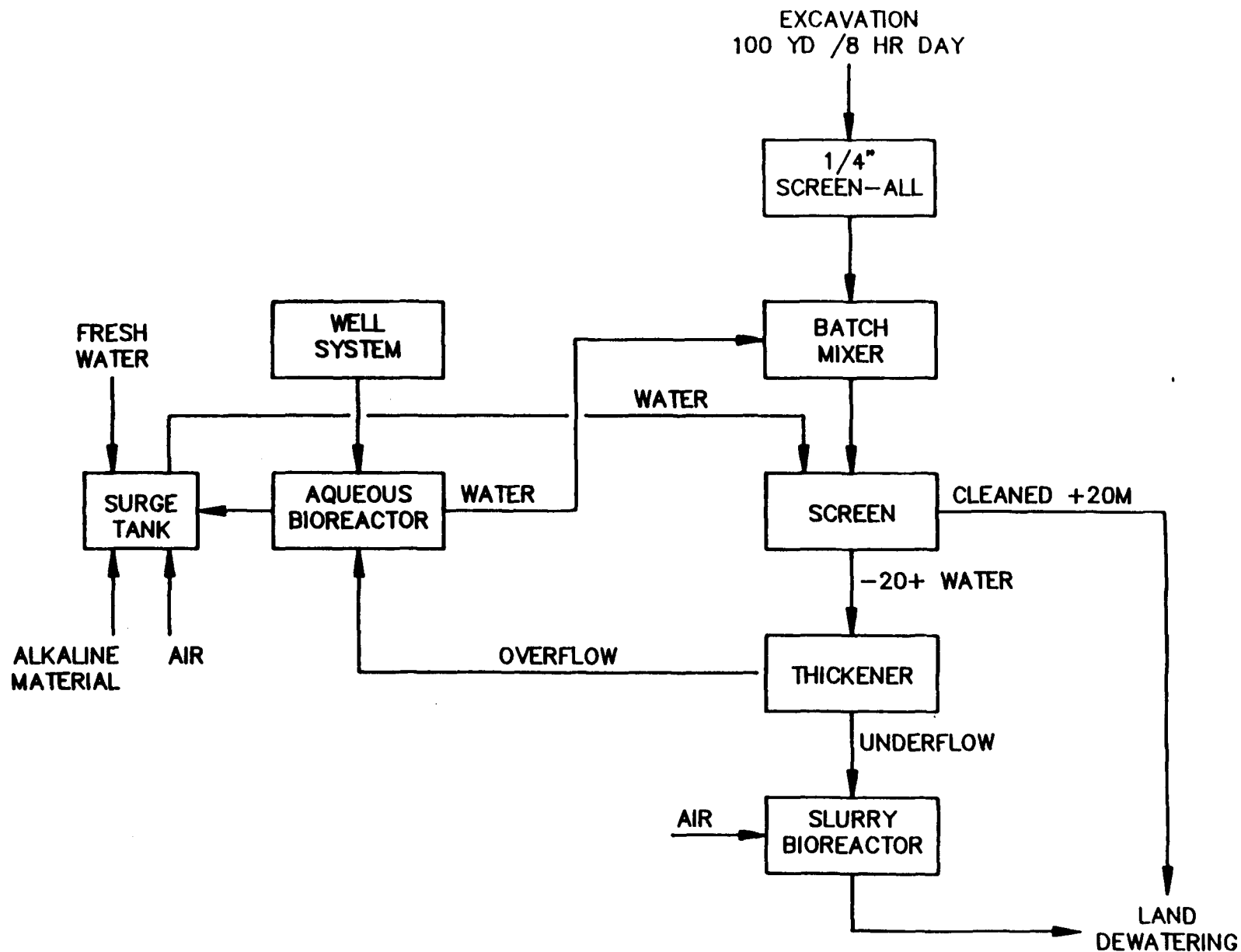


FIGURE 2-2. Block Flow Diagram

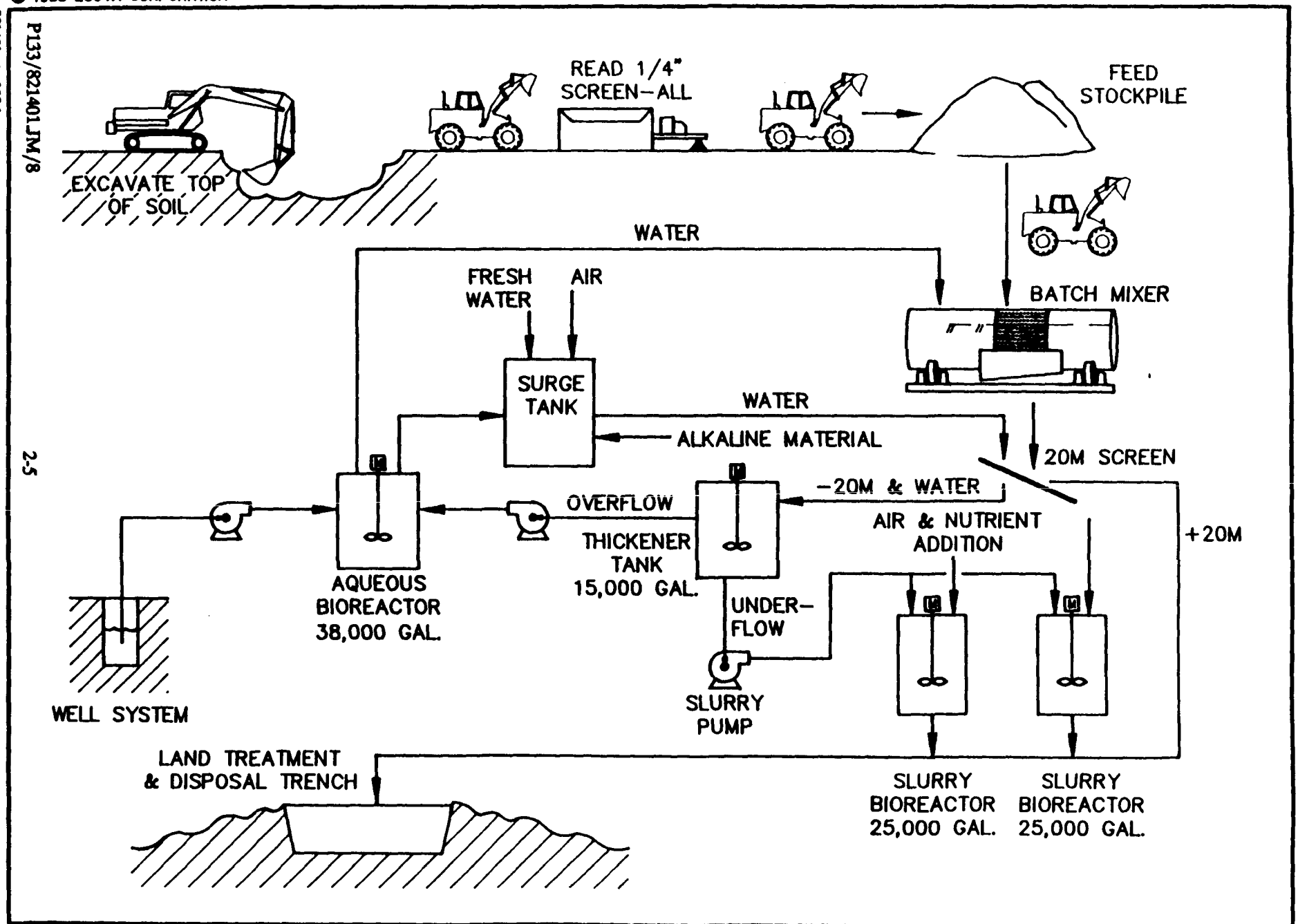


FIGURE 2-3. Process Flow Diagram



The treatment system consists of the following major subsystems as discussed in detail below:

- o Excavation/Screening/Stockpiling Operation
- o Batch Mixer Unit and Feed Hopper/Conveyor
- o Shale Shaker Screen Unit
- o Thickener Unit
- o Slurry Bioreactor Unit
- o Groundwater Extraction System
- o Aqueous Bioreactor Unit
- o Liquid Surge Tank
- o Solid Phase Treatment/Land Disposal Unit
- o Miscellaneous Pumps, Piping, Etc.

#### **2.2.1 EXCAVATION/SCREENING/STOCKPILING OPERATION**

To halt the migration of PCP contamination from the contaminated soil into the groundwater and to provide a blended feedstock for the treatment operation, Ecova will excavate and remove the contaminated soils. The contaminated soils will then be screened, blended and stockpiled until the slurry treatment system is ready to accept them as feed material. Excavation will follow the plan developed during the engineering phase as previously described.

During construction of the treatment system the contaminated soil will be completely excavated, screened to minus 0.25 inch to remove construction debris or other oversize material, and stockpiled on a bermed plastic liner. The pile will be covered with polyethylene sheeting until reclaim operations for input to the treatment system commence. This step will result in a prepared and blended feedstock for the treatment system. The stockpile will also provide containment for rainfall runoff to prevent any further contaminant migration.

Removal operations will be performed with two pieces of standard earthmoving equipment: a three cubic yard front end loader (wheeled) and a backhoe. Soil will be removed until soils that are not contaminated (through testing) are encountered or until the groundwater table is reached. The threshold criteria used to distinguish contaminated from uncontaminated soils will be established by agreement with ODEQ and Time Oil before excavation commences.

The removed soils will be passed over a coarse screen located in the excavation area. A two-stage Read Screen-All unit equipped with minus 2 inch and minus 0.25 inch screens will be used to remove construction debris, gravel and other oversize material. In Ecova's experience, this is an essential step to minimize downstream operating problems that oversize debris can cause for materials handling equipment such as pumps, conveyors and mixers. Oversize materials can be directly disposed in the solid phase treatment/disposal area or can undergo additional washing in the batch mixer to remove surface PCP contamination which might be present.

Screened soil will be placed in lifts on a stockpiled area lined with a 12 mil polyethylene plastic liner. A low earthen berm will surround the stockpile to contain any contaminated rainfall runoff and a plastic lined sump area will be provided to catch and accumulate water. Any water captured will be pumped into the recovered groundwater storage tank. An equipment decontamination area will be included within the bermed, lined area to provide for cleaning of the earthmoving equipment after excavation of the contaminated soil is complete. A steamcleaner will be used to assure that decontamination is thorough. Decontamination fluids accumulated in the sump will be treated in the treatment system after startup.

Blending the excavated soil is important since the boring data indicate that there are significant hot spots. If these hot spots were to be fed into the bioreactor, they could result in the kill-off the microorganisms and severely disrupt the biodegradation process. Blending assures a slurry feedstock very close to the overall average PCP concentration. The screening operation will achieve some blending of the contaminated soil. Distributed placement of the soils in the stockpile area will also facilitate the blending operation.

After placement in the stockpile, the soil will be covered by six mil polyethylene plastic sheeting to control airborne dust emissions during storage. The sheeting will be carefully weighted to prevent damage by the high winds occurring periodically in the Willamette River valley.

The excavation will be backfilled with borrow material obtained on-site. Borrow material will be obtained from the decontaminated slurry disposal landfill area (solid phase treatment), the construction of which shall be phased to coincide with the excavation operations.

#### **2.2.2 BATCH MIXER UNIT AND FEED HOPPER/CONVEYOR**

The first step in the treatment process operation will be to reclaim from the stockpile and feed the blended soil into a hopper/conveyor and into the batch mixer unit. In the batch mixer, the soil is tumbled to break up lumps and sprayed with water to form a thin slurry. Coarse screening of the feed material will have already been performed during the excavation, so the primary purpose of the batch mixer is to form the thin slurry for further screening in the shale shaker screen. Makeup water will come from the aqueous bioreactor tank with alkaline adjustment to raise the soil pH from around 5 to approximately 7.2 prior to feeding into the next units.

The batch mixer unit is a rotating drum unit that has low energy requirements, and is inexpensive to operate, reliable, and commonly available. The unit is portable and requires no concrete foundations for mounting. The unit will only be operated while charging the slurry bioreactor with a new batch of feed.

#### **2.2.3 SHALE SHAKER SCREEN UNIT**

After formation of the thin slurry, additional fine screening of the material will take place in the shale shaker unit mounted above the thickener tank. A shale shaker screen is a multideck, vibrating box screen used extensively in the oil drilling industry to remove rock and gravel from drilling muds. These have several screen decks which will successively remove oversize material from 0.25 to 0.033 inch (standard 20 mesh screen). Minus 20 mesh particle size is optimum for maintaining a thick slurry with minimum mixer horsepower requirements and no sanding/settling problems. The unit discharges into the thickener tank.

Oversize screened material is expected not to be contaminated, and therefore would be disposed directly in the solid-phase treatment land disposal area.

#### **2.2.4 THICKENER UNIT**

Finely screened thin slurry from the shale shaker screen is thickened by removing excess water up to the necessary density for feed to the slurry bioreactor. The design basis density is 35 percent solids which is an optimum slurry density for the type of soils found at the site. Overflow clarified water

is pumped to the aqueous bioreactor unit; underflow thickened slurry is pumped to the slurry bioreactor units.

The Ecova thickener unit is a rectangular box tank that operates under a zone gravitational settling regime. The unit is fed from one end and overflows from the opposite end. Thickened slurry is withdrawn from the bottom of the tank. The unit is a 15,000-gallon, transportable, modular steel tank that is mobilized to the site on a self-loading flatbed trailer. It requires no concrete foundation, normally being placed for operation on an asphalt or gravel pad. The unit comes equipped with plumbing and liquid pump for transport of the clarified liquid.

#### **2.2.5 SLURRY BIOREACTOR UNIT**

The Ecova Slurry Bioreactor unit is also a rectangular box tank that is equipped with three electric motor-driven slow speed mixer units. The mixer blades provide agitation to keep the slurry in suspension, well mixed and operating under aerobic conditions. Additionally, the unit is equipped with air sparge to provide oxygen in solution.

Like the thickener unit, the bioreactor unit is a transportable, modular steel tank that is mobilized to the site on a self-loading flatbed trailer. Nominally, the unit has approximately a 25,000 gallon capacity. It also requires no concrete foundation, normally being placed for operation on an asphalt or gravel pad.

Consideration was given to modifying the existing 38,000-gallon steel tank located at the site. While this is potentially feasible because the tank appears to be structurally sound, there are a number of possible complications that could make this conversion more costly than mobilizing a modular tank. The tank was engineered for holding oil or water liquids rather than high density slurries. This would undoubtedly reduce the capacity of the tank to that comparable to a standard Ecova bioreactor unit. The capital cost of modifying this tank is probably not warranted when the duration of operation is to be short (a few months). Finally, the unknown condition of the steel wall introduces some risk for slurry application. Therefore, an additional Ecova bioreactor will be mobilized.

#### **2.2.6 GROUNDWATER EXTRACTION SYSTEM**

In a separate letter dated August 11, 1988, Ecova proposed a program to install additional monitoring wells at the site. If appropriate, these wells could be used as groundwater extraction wells. The proposed program also included an evaluation of the overall groundwater situation and subsequent design of the extraction system for recovery of PCP contaminated groundwater. Pending additional study of the extent of groundwater contamination, the needed rate of groundwater pumping, and installation of any additional recovery wells or trenches, detailed design of the groundwater treatment component of this scope of work is not possible.

However, the soil treatment system uses extensive quantities of water for slurry makeup and therefore large quantities of contaminated groundwater can simultaneously be treated in the slurry bioreactors, if available. It is likely that groundwater extraction and treatment may continue after completion of soil treatment. Therefore provisions for continued groundwater treatment have been included in the conceptual design.

It is recommended that the groundwater study program proceed as quickly as possible to gather the needed data on quantities and contaminant concentrations.

### **2.2.7 AQUEOUS BIOREACTOR UNIT**

A provision for an aqueous bioreactor unit has been included in the conceptual design of the treatment system. There are several purposes for inclusion of this unit. First, the unit provides overflow capacity for storing water from the thickener unit. Overflow water from the thickener will have solubilized some PCP from the slurried soil and the bioreactor unit will provide capacity for treating this flow. Second, the unit provides additional bioreactor capacity for treating both overflow water and extracted groundwater. Groundwater would be pumped directly to this unit. Liquid bioreactors are capable of higher rates of degradation for PCP than are slurry- or solid-phase treatment operations. Third, the bioreactor unit will serve as a source of decontaminated recycle water and biomass for fresh slurry makeup when preparing another batch for the slurry bioreactor. Further, since the treatment of groundwater may need to continue after completion of the soil treatment phase, this bioreactor unit will provide the capacity.

The aqueous bioreactor will be constructed from the 38,000 gallon tank currently on site. Modifications necessary to convert the tank to this service include: 1) Thorough cleaning and patching as needed; 2) Equipping the tank for compressed air sparge; 3) Modifying the piping to allow connection to the rest of the treatment system and pumps; and 4) Flow and level control instrumentation. Overflow from this tank will be sent to the surge tank for temporary storage.

### **2.2.8 LIQUID SURGE TANK**

Provision has been included for an additional surge tank which will primarily be used to temporarily contain excess water which may accumulate in the system, such as during the rainy season, when higher groundwater extraction rates are needed, or if there are restrictions on fresh makeup water availability during the summer dry season.

Currently we anticipate this tank to consist of one of the existing horizontal tanks located on site (formerly buried gasoline tanks). These tanks are the approximate capacity needed and appear to be in adequate shape. Capacity needed for the surge tank is expected to be between 5000 to 10,000 gallons. Modifications include flushing, leak repair, and piping connection. These horizontal tanks will have to be moved from their present location to allow construction of the treatment system. The tank selected for service as the surge tank will be relocated onto a gravel pad which will serve as a supporting foundation.

### **2.2.9 SOLID PHASE TREATMENT/LAND DISPOSAL UNIT**

After each batch of soil has finished slurry treatment, the bioreactors will be emptied via pumping through a pipeline to the solid-phase treatment/land disposal unit that is located north of the treatment system. This unit will consist of an excavation of approximately 38,000 square feet of clean soil to a depth of 2.5 ft. As discussed previously, clean soil from this excavation will be used as borrow material for filling the contaminated excavation near the warehouse at the site.

This unit will not be lined with either a clay or membrane liner. By not using a lining, excess water from the treated slurry disposal will percolate into the groundwater up-gradient from the contaminated site carrying PCP-degrading microorganisms into the contaminated area. This also serves to eliminate excess decontaminated water from the system. However, decanted water forming on the surface of the impoundment may be pumped back into the surge or aqueous bioreactor tanks, if needed.

### **2.2.10 MISCELLANEOUS PUMPS, PIPING, ETC.**

Other equipment will be needed to fill out the necessary equipment list for operation of the treatment system. Included on this list are:

- o Piping to connect the processing units and pumps to each other;
- o Slurry and liquid pumps needed to move the materials through the piping and treatment units;
- o Air compressor to provide for bioreactor air sparging;
- o Leased earthmoving equipment for excavation and reclaiming operations;
- o Office and Lab trailer;
- o Gravel as a base for under the processing units;
- o Plastic liner for the stockpile only (12 mil black polyethylene proposed)
- o Clean sand to protect the liner during stockpile construction;
- o Electrical materials needed to provide electrical service to the treatment units;
- o Small hand tools;
- o Personal protective equipment including coveralls, gloves, etc.

### **2.3 WORK PROGRAM**

Following the development of the conceptual treatment system as previously discussed, a planned program for implementing the installation and operation of this system onsite was prepared and as discussed below as illustrated in Figure 2-1, work breakdown structure.

#### **2.3.1 TASK ONE - TREATMENT SYSTEM DESIGN**

Upon authorization to proceed, Ecova will refine the conceptual engineering design as discussed in Section 2.2. The site will be surveyed by an Oregon licensed surveyor to provide an accurate base map. The engineering effort will focus primarily upon the civil design and construction of the materials handling, treatment and disposal subsystems for the soil slurry system.

The excavation plan will be prepared in detail for:

- 1) Removal of the contaminated soil including special operating considerations for shoring around the warehouse foundations to prevent structural damage;
- 2) Materials handling including screening, blending, and transport operations;
- 3) Layout and design of the stockpile area including the runoff water sump, berms, and liner;
- 4) Removal and construction of the solid phase treatment/disposal area; and
- 5) Backfilling sequence for borrow material.

Design drawings will be prepared showing the equipment layout, cut and fill locations, and other information needed in the engineering effort.

#### **2.3.2 TASK TWO - SECURING REGULATORY AUTHORIZATION**

As the engineering design work progresses, it is assumed that Time Oil will conduct negotiations with ODEQ to secure approval of the treatment program. Ecova anticipates providing support to Time Oil in this effort in the form of professional consulting services, attending meetings with ODEQ, preparing and revising any needed submittal documents, etc. This support will be performed

as directed by Time Oil on a time and material basis. It is impossible to adequately anticipate the necessary level of effort required in negotiating with ODEQ.

We propose that Ecova services for this activity be provided on a change order basis. As an activity is identified that needs services provided by Ecova, a short change order would be prepared by the Ecova Project Manager and sent by facsimile for review and approval by Time Oil. This change order would provide a short description of the specific service requested, the anticipated costs (not to exceed) to perform this activity, and the expected schedule. Change Orders such as these typically do not exceed one page in length and represent modifications to the contracted work. A copy of the change order would be signed by the Time Oil Project Manager and returned to Ecova which would authorize the work. A separate breakout of costs for this element would be provided on the invoice from Ecova. Using this system, Time Oil has full control of any time and material costs that are outside the contract scope.

Securing regulatory approval is a milestone in the remediation program since mobilization and construction of treatment equipment should not commence until all regulatory constraints have been identified.

### **2.3.3 TASK THREE - MOBILIZATION AND CONSTRUCTION**

With a final engineering design, an approved work plan, and equipment procured, Ecova will mobilize its construction and installation team to the Portland site to build the treatment systems. The mobil office/lab trailer will be set up. The treatment units will be mobilized by truck to the site and assembled. Gravel pads will be laid for placement of the tanks and treatment units. Piping and electrical connections will be made. Modifications to the 38,000 gallon tank needed to convert it to aqueous bioreactor service will be made. Connection to utilities will be made.

Again, activities under this task would be sequenced to coincide with Task Four, Excavation of Contaminated Soil, so that the stockpile of contaminated soil is ready when the treatment system is ready to commence operations.

### **2.3.4 TASK FOUR - EXCAVATION OF CONTAMINATED SOIL**

Task Four will consist of the activities previously described in the Excavation/Screening/Stockpiling Operation in the Conceptual Engineering Design.

### **2.3.5 TASK FIVE - STARTUP AND SHAKEDOWN**

Upon completion of the installation of all processing equipment and construction of the disposal area, startup and shakedown of the treatment system will commence. Since the treatment operations are expected to be operated in batch mode, careful monitoring of several initial batches will be followed to insure that biological activity is progressing as expected and that optimum biodegradation rates are obtained. During the first batch, an acclimated culture is being built up from the Ecova proprietary strain which will provide the optimum PCP biodegradation. After initial culture development, subsequent batches will be inoculated with the initial culture during recharge of the bioreactors.

Startup and shakedown operations are expected to occur over approximately a one month period (two to four batches).

### **2.3.6 TASK SIX - TREATMENT OPERATIONS**

After establishment of an acclimated culture and verification of complete biodegradation, treatment operations can proceed on a routine basis. As each batch completes the treatment cycle, the slurry reactors will be emptied and recharged with a fresh soil slurry. Treated slurry will be pumped to the disposal landfill area. Sequential batches will be run until the stockpile has been completely treated.

The biotreatment system will operate in largely unattended operation mode during each batch. Ecova will rely upon Time Oil personnel onsite to periodically monitor the rotating and moving equipment in the process for normal operation. In this manner, the system will not have to be continuously manned, with subsequent cost savings to Time Oil. (In the event of equipment failure, an Ecova maintenance team would be mobilized to correct the problem.) The Ecova operations team will mobilize to Portland after completion of the biotreatment process for each batch. The operations team for routine batch reactor operation will consist of two Ecova technicians from the Redmond office.

After arriving at the site, the operations team will check out the operating equipment and commence pumping the treated slurry out of the bioreactors into the landfill disposal (solid phase treatment) area.

### **2.3.7 TASK SEVEN - DEMOBILIZATION**

At the completion of all treatment activities, the treatment system will be decommissioned and the site cleaned of all trash. All decontaminated materials placed in the disposal area will be levelled and dewatered.

As part of this work plan, we propose that all equipment owned by Ecova be allowed to remain on site after completion of the treatment activities (without imposition of a storage charge by Time Oil) until such time as it becomes necessary to mobilize it to another project site. This period would not exceed one year. By allowing storage of our equipment, Ecova is able to pass along the savings in demobilization charges to Time Oil which would otherwise be incurred. Demobilization charges would be incurred by the next project for which the equipment is used.

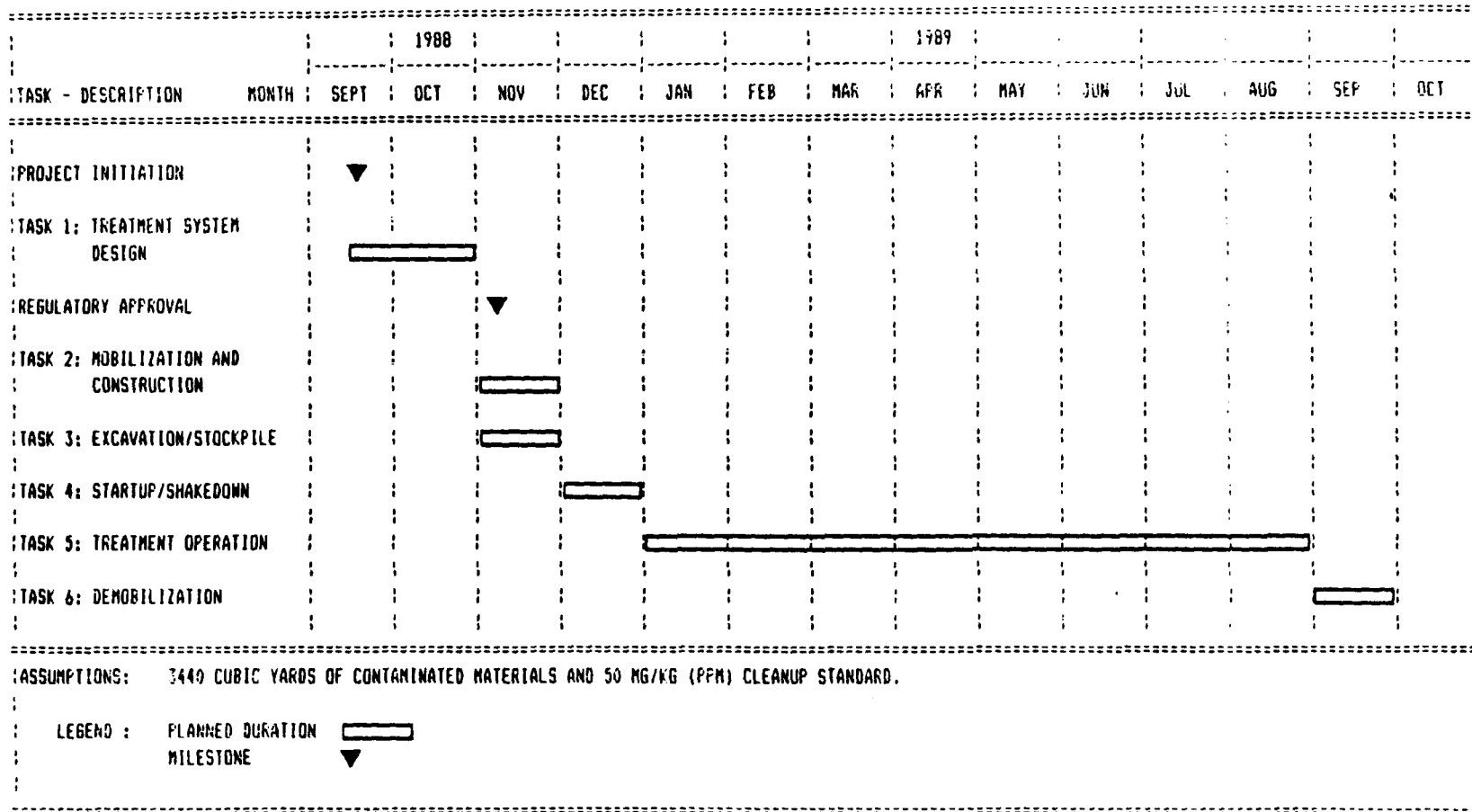
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PROJECT NO. B21401  
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 LOCATION : PORTLAND - OREGON  
 FILENAME: TOSCH50

ECOVA CORPORATION  
 SEPTEMBER - 1986

PROJECT SCHEDULE  
 TIME OIL COMPANY  
 50 PPM CLEANUP STANDARD

3-1



3. SCHEDULE



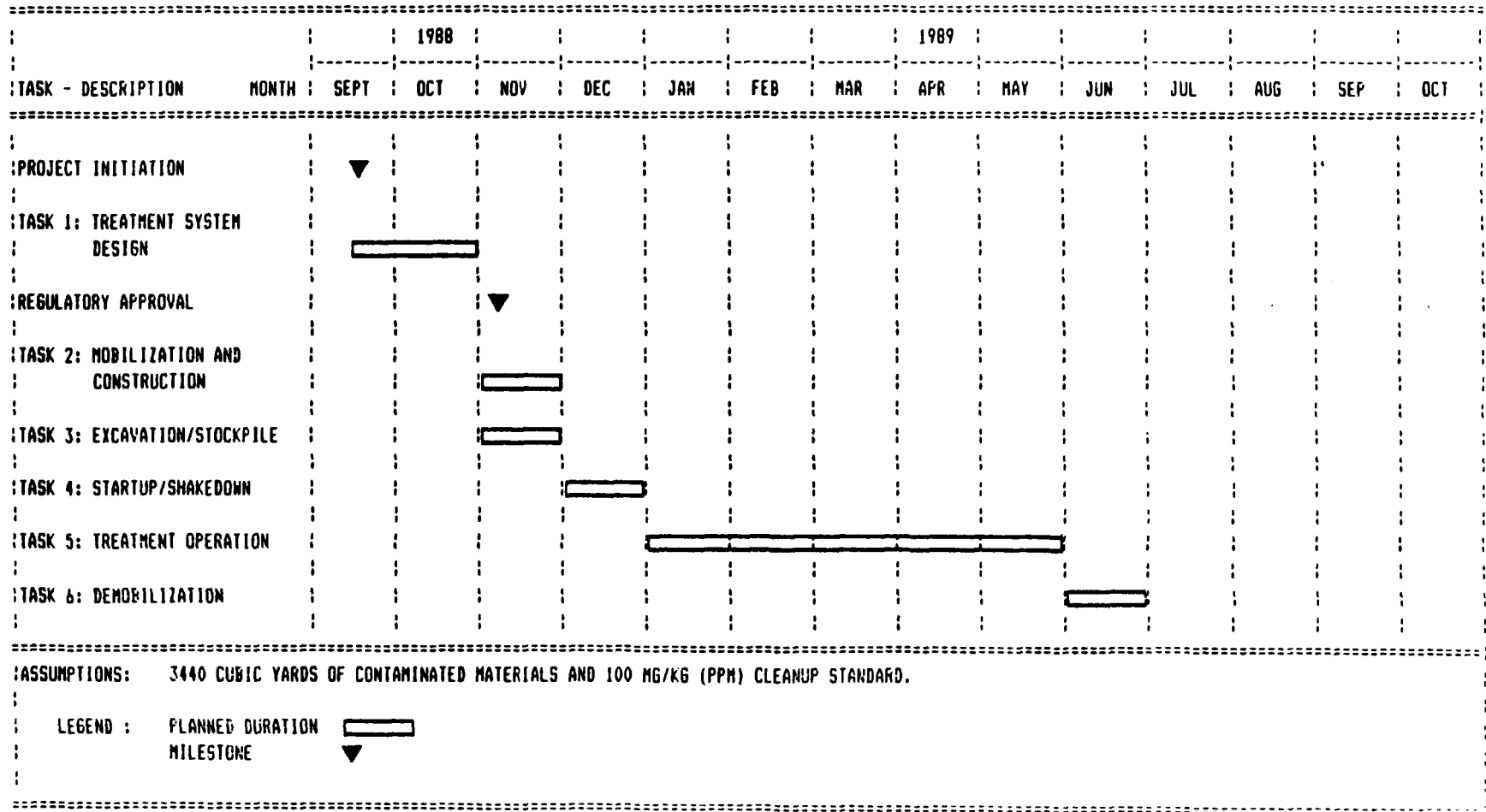
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 LOCATION : PORTLAND - OREGON  
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EDVA CONFIRMATION  
 SEPTEMBER - 1988

PROJECT SCHEDULE  
 TIME OIL COMPANY  
 100 PPM CLEANUP STANDARD

3-2



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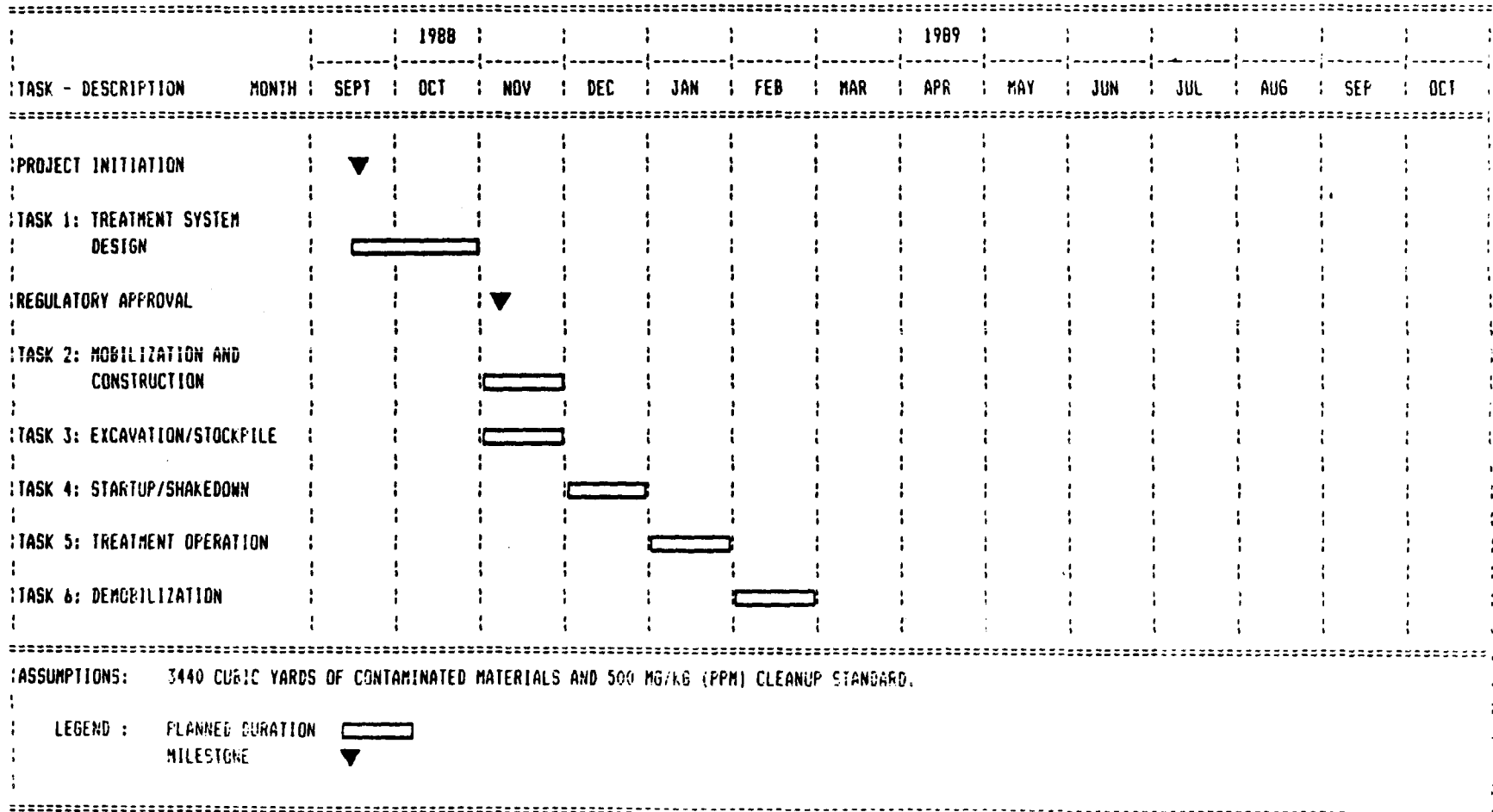
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PROJECT NO. 821401  
 CLIENT : TIME OIL COMPANY  
 LOCATION : PORTLAND - OREGON  
 FILENAME: TOSCH500

EDOWN CORPORATION  
 SEPTEMBER - 1988

PROJECT SCHEDULE  
 TIME OIL COMPANY  
 500 PPM CLEANUP STANDARD

3-3



#### 4. PROJECT COSTS

Costs have been estimated for the remediation program and are presented in Table 4-1. As requested by Time Oil Company, costs have been prepared for each cleanup scenario 500 ppm, 100 ppm, and 50 ppm.

Costs were developed based on remediating 3440 cubic yards of contaminated soil. Cost have also been provided in Table 4-1 for treating additional soil in excess of the 3440 cubic yards, should such soil be identified. All costs were developed based on a starting assumption of 680 ppm PCP from the blended stockpile. This assumption is based on soil samples obtained by Ecova and upon our evaluation of the soil boring data provided by Time Oil. Obviously the total volume of soil needing treatment (and hence total costs) will be affected by cleanup levels mandated by ODEQ.

Included in the cost basis are engineering design, mobilization; excavation, blending and stockpiling of contaminated soil; construction and startup of treatment facilities; soil treatment; and equipment decontamination after treatment.

Costs have not been included for negotiations and document preparation to secure ODEQ approval. As discussed in the text, these costs would be charged on a time and materials basis with an accompanying approved Change Order.

Additionally, costs do not include demobilization of the treatment equipment. As discussed in Section 2.3.7, Task Seven-Demobilization, Time Oil will provide storage for this equipment for up to one year in lieu of demobilization costs.

**TABLE 4-1. Project Costs for Cleanup Levels (50,100 + 500 ppm)  
Time Oil Site Remediation - Portland, Oregon**

<u>Activity</u>	<u>50 ppm</u>	<u>100 ppm</u>	<u>500 ppm</u>
Total Project Costs	\$ 348,839	\$ 311,538	\$ 220,265
Total Onsite Treatment Costs per cubic yard	101	91	64
Additional Treatment and Excavation Costs per cubic yard	66	55	30

**Assumptions:**

1. Based on 3440 cubic yards of PCP contaminated soil
2. Based on a starting assumption of 680 ppm from the blended stockpile
3. Based on a half-life of 1.4 days
4. For 50 and 100 ppm cleanup levels, operation is based on using two bioreactors operating on batch mode. For a 500 ppm cleanup level, operation is based on using one big reactor fed continuously.

## **5. PROJECT MANAGEMENT**

### **5.1 PROJECT ORGANIZATION AND PERSONNEL**

Ecova has assembled an experienced project team to manage the onsite cleanup of soil and groundwater at the Time Oil Northwest Terminal site. Team members represent the engineering and scientific disciplines necessary to accomplish the goals of the project.

Technical responsibility for engineering, scientific and professional disciplines will rest with lead engineers and scientists. Key team members and their responsibilities are summarized below. The project organization is illustrated in Figure 5-1. Full resumes are provided in Appendix B.

**Mark Anderson, Sr. Project Manager**, will oversee all project efforts. He has over 13 years of project management and engineering experience in the hazardous waste industry with extensive experience managing the cleaning of soil and groundwater. As Project Manager, Mr. Anderson will direct all aspects of day-to-day management on technical, business, contractual, and administrative issues. Mr. Anderson will ensure that personnel and resources are available and fully utilized. He will analyze project requirements and maintain an up-to-date status of each phase of the project. Mr. Anderson will manage field, engineering and laboratory activities. He will be responsible for ensuring project safety and reporting contractual data in support of all project requirements. Mr. Anderson will be Time Oil's day-to-day point of contact.

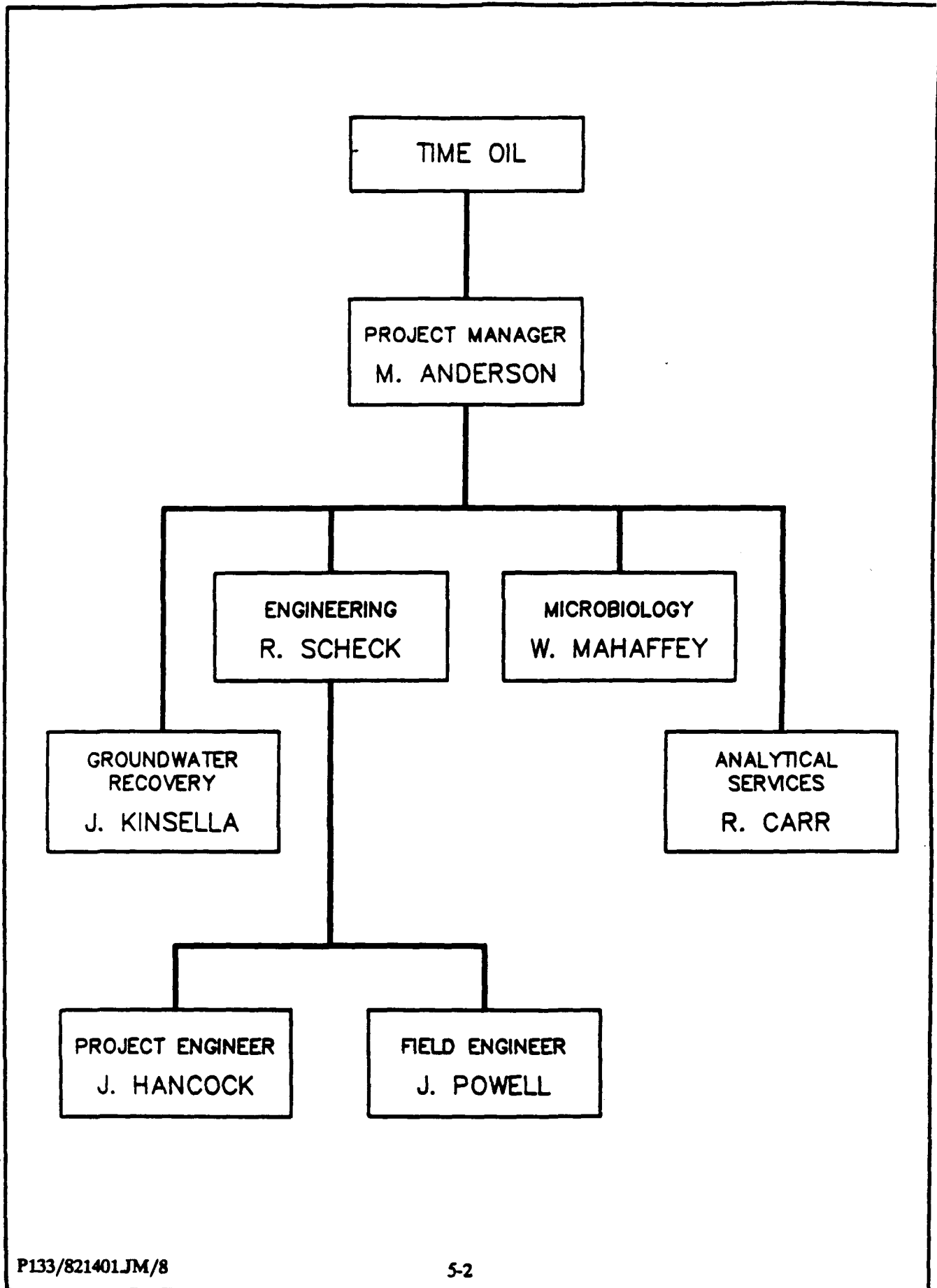
**Robert Scheck, Director Engineering**, will oversee all engineering aspects of this project. His qualifications include 20 years of engineering process design and management. For this project he will analyze parameters for treatment system, manage the system operations, design efforts, and oversee the transfer of engineering parameters to the field. Mr. Scheck has designed soil and groundwater remediation systems of similar size and complexity to that at Time Oil in accordance with federal, state, and local regulations.

**John Hancock, Project Engineer**, will design the soil treatment system. He will also be responsible for the preparation of engineering cost and manpower estimates. Mr. Hancock is a petroleum engineer and chemist who specializes in the design and maintenance of fluid systems adapted for soil and groundwater treatment.

**Jeffrey Powell, Field Engineer**, will supervise the fabrication, installation, and operation of the soil and groundwater treatment systems. He will modify any Time Oil equipment that will be used in the treatment program, direct the work of the field crews, and provide onsite equipment maintenance support. Mr. Powell has nine years of experience in field equipment fabrication, startup, and operation.

**John Kinsella, Vice President, Geosciences and Field Operations**, will support this project by serving as the groundwater recovery expert. He will manage the integration of the site groundwater recovery system into the soil treatment program. Mr. Kinsella has conducted numerous similar site remediation projects. He is also experienced in permit applications for groundwater restoration programs and negotiation with federal, state, and local agencies.

FIGURE 5-1. Project Organization



**William Mahaffey, Ph.D., Project Scientist**, will direct the operations of biological processes in the field, interpret microbiological data, and determine all microbiological operating parameters. Dr. Mahaffey specializes in microbial biochemistry and has 10 years' experience in biological degradation of organic chemicals. He has extensive experience in the biodegradation of pentachlorophenol, petroleum hydrocarbons, chlorinated compounds, and other contaminants. Dr. Mahaffey is responsible for research efforts involving the isolation and enrichment of microorganisms collected from the field for use in promoting biodegradation.

**Rod Carr, Director of Analytical Services**, will coordinate the services provided by Ecova's analytical chemistry laboratory. Mr. Carr has 20 years of experience in managing laboratory facilities, and manages the Ecova analytical laboratory in Redmond, Washington.

## **5.2 SUPPORT SERVICES**

The project team will receive full support from the Ecova corporate headquarters in Redmond, Washington. Corporate accounting, administration, and personnel functions will provide administrative support to the project throughout its duration. The Redmond headquarters will also serve as a source of scientific and engineering expertise to the project. Ecova is a complete hazardous waste research center and maintains ongoing waste remediation development work. Ecova's analytical laboratory, technology development laboratories, and engineering design and fabrication capabilities will support all aspects of the project. Corporate support services are described below.

### **5.2.1 RECORDS MANAGEMENT**

Written documentation prepared during the course of the project will be clearly marked with the date and project number. Originals of all reports and correspondence will be kept in the central project file. All files generated as a result of this project will be available for review by Time Oil. Records originated during the course of the project will be controlled and retained in the project central files, laboratory files, and the Ecova corporate permanent storage files, as appropriate. Proprietary information will be marked "CONFIDENTIAL" and distribution will be limited.

### **5.2.2 MICROBIOLOGY**

The Ecova Microbiology Group conducts research concerning interactions of microorganisms with ecological processes and environmental pollutants in complex ecosystems. The group consists of a nationally recruited scientific staff with training in molecular biology, microbial ecology, microbial genetics, plasmid ecology, microbial biochemistry, and environmental chemistry. The group's research and development interests are focused on the application of the mechanisms of biodegradation on toxic and hazardous waste.

Research and development of treatment processes is conducted at the Ecova Technology Development Center in Redmond, Washington. This facility contains a number of highly specialized laboratories that occupy 16,000 square feet of a 40,000 square foot building of which Ecova Corporation is the sole occupant. The facility was designed specifically to meet the needs of a large capacity research, development, and analytical program.

Ecova's research and development program is designed to respond to client research needs through practical application of innovative, independent investigations to complex problems. The group has a highly specialized group of scientists who work closely with research associates and environmental

engineers assigned to other groups within the company. This group will be available to provide technical and scientific advice to the project team.

### **5.2.3 ENGINEERING**

Waste treatment processes and facilities are designed by registered professional engineers assigned to the Engineering Group. In-house staff expertise includes environmental, chemical, civil, mechanical, electrical, and construction engineering disciplines.

Ecova engineers work closely with the firm's geologists, microbiologists, chemists, and regulatory affairs specialists in the design of treatment systems. They also assist in system fabrication, installation, startup, and operation. The firm's Fabrication Engineering group constructs the specialized treatment equipment and facilities that are typically not available "off the shelf" and is responsible for onsite installation and maintenance.

### **5.2.4 ANALYTICAL SERVICES**

Ecova Analytical Services (EAS) is a full-service analytical laboratory specializing in the chemical analysis of environmental and hazardous waste samples. The laboratory is approved for work by the U.S. EPA under the Contract Lab Program (CLP) and by the U.S. Army Corps of Engineers. It currently provides comprehensive environmental analytical services to government and commercial clients and supports all Ecova remediation projects.

EAS is staffed with highly qualified and experienced chemists. All laboratory personnel are experienced in analyzing toxic and hazardous waste samples. Through this experience, EAS provides clients with accurate, consistent, and reliable analytical services and reporting. Procedures, methods, and practices meet or exceed standards for environmental samples established by U.S. Environmental Protection Agency. In addition to standard analyses, the laboratory develops, validates, and performs custom analyses as required to meet a client's needs.

### **5.2.5 QUALITY ASSURANCE/QUALITY CONTROL**

Ecova has a comprehensive Quality Assurance/Quality Control Program, which provides for uniformity and control of services. This program includes defined policies for:

- o Sampling and sampling control (chain-of-custody)
- o Laboratory procedures
- o Analytical services
- o Preparation of calculations, drawings, and reports
- o Control of computer data reduction software including verification and data management
- o Peer review
- o Personnel quality assurance/quality control responsibilities
- o Preparation and control of quality assurance documents
- o Personnel training
- o Record preparation, collection and maintenance

## **6. EXPERIENCE**

The bioremediation system proposed for cleanup of the Time Oil Company Site was developed within Ecova's ongoing hazardous waste treatment research and development program. This section provides an overview of Ecova's development of the bioremediation techniques and the constituents that can be treated. This section is followed by Ecova project summaries of site remediations that are similar in size and complexity to the Time Oil site.

### **6.1 TECHNOLOGY DEVELOPMENT AND CAPABILITIES**

Ecova's corporate policy is to develop and deliver multiple processes for the treatment of hazardous waste, based on an understanding of the science behind the process. In bioremediation this involves an application of microbiological research and development with environmental and hydrogeological engineering. Ecova is the only commercial company with this level of expertise. Microbiologists at Ecova have determined the limiting physiological and environmental factors affecting the rate and extent of biodegradation of pentachlorophenol. This knowledge will be incorporated into the remediation of the Time Oil site.

The bioremediation operating parameters to be used at the Time Oil site incorporate processes developed for the biological remediation of pentachlorophenol, creosote, and other wood treating wastes developed by Ecova. This technology was developed during a 20-month treatment study Ecova conducted on behalf of a client responsible for the cleanup of a wood treating site, an NPL site in the Western United States (detailed on page 7-5). Ecova's work determined operating parameters, rates, and cleanup levels for a full-scale remediation program incorporating slurry-phase and other bioremediation processes. Research and development work from this project including data demonstrating the complete mineralization of pentachlorophenol is also included in Appendix C.

The slurry-phase bioremediation techniques to be used at the Time Oil site were first used by Ecova at a client site in North Dakota in which more than 10,000 cubic yards of soil contaminated with high concentrations of chlorinated pesticides (up to 13,000 ppm 2,4-D) were remediated using both slurry- and solid-phase systems. On this project, three slurry-phase bioreactor units, each capable of treating 26,000 gallons of fluid, were mobilized to the site. Material was withdrawn from a stockpile of highly contaminated soil and placed in a trommel unit that slurried the soil and separated out stones and rubble. The slurry was then pumped into the bioreactors for treatment. This project is described more fully on page the following page.

Since this initial application, Ecova developed modifications to the slurry systems for the handling of petroleum-contaminated soil and hydrocarbon sludges, including those contaminated with pentachlorophenol.



## **6.2 REFERENCES**

The following client references are provided from projects of scope and size similar to that at Time Oil. Full descriptions of these projects are provided on pages 6-3 to 6-8.

### **6.2.1 WOOD TREATING WASTE BIOREMEDIATION DEVELOPMENT**

Ecova conducted a 20-month treatment study to develop advanced biological treatment techniques for the cleanup of pentachlorophenol and other wood treating wastes at a Superfund site in the western United States. The program encompassed basic laboratory research, bench-scale work, systems design, and follow-on field pilot demonstrations.

Client Reference: Mr. Keith Piontek  
CH2M Hill  
P.O. Box 22508  
Denver, Colorado  
(303) 771-0900

### **6.2.2 SOIL ENHANCED SLURRY-PHASE BIOREMEDIATION**

Ecova managed soil and groundwater cleanup at a site in North Dakota that was contaminated as a result of a fire at a chemical storage facility. Slurry and solid-phase treatment technologies were used to treat more than 10,000 cubic yards of soil contaminated with chlorinated pesticides within a two-month time frame. A groundwater pump and treat system was implemented to remediate contaminated groundwater.

Client Reference: Mr. Rick Anderson  
Westchem Agricultural Chemicals  
P.O. Box 31772  
Billings, Montana  
(406) 245-4171

### **6.2.3 CONTAMINANT VOLATILIZATION/BIOREMEDIATION**

At a Superfund site in California, Ecova operated a groundwater decontamination system that removed both chlorinated hydrocarbons and soluble organics. A two-step process employing air stripping in conjunction with a bioreactor was implemented. A bench-scale model of the treatment system was developed to evaluate and define the operating parameters of the treatment system.

Client Reference: Mr. Dan McCaskill  
Sr. Vice President  
Van Waters & Rogers  
2600 Campus Drive  
San Mateo, California  
(408) 435-8700

# **IN SITU PROCESS DEVELOPMENT PROGRAM FOR WOOD TREATING WASTE**

**PROJECT LOCATION:**

NPL Site - Wyoming

**CLIENT:**

Confidential

**INDUSTRY:**

Transportation (Railroad)

**CONTAMINANTS:**

Pentachlorophenol, Polynuclear Aromatic Hydrocarbons

## **PROBLEM:**

A former railroad tie-treating plant has been named to the NPL list due to significant creosote contamination. The 100-acre plus hazardous waste site holds creosote-contaminated soil and groundwater in unlined surface impoundments containing approximately 1 million cubic feet of waste. Pentachlorophenol (PCP) was found to be in excess of 150 ppm, significantly above the acceptable limit. The client is looking for an alternative to incineration.

## **SOLUTION:**

Ecova Corporation was hired to conduct a 20-month treatability study and process development program to develop advanced in situ treatment techniques for this site. The study is designed to determine the rate and ultimate cleanup levels achievable with a full-scale bioremediation program. Currently in the final phases of the program, Ecova has successfully proven and demonstrated that the wastes can be bioremediated and PCP can be reduced to 2 ppm. The study included basic laboratory research and bench-scale work systems design. The contamination remediation techniques examined are:

- Surface and subsurface soil bioremediation techniques
- Soil wash leachate and groundwater treatment evaluation

Laboratory bench-scale studies, begun in the fall of 1986, include a thorough analysis of site soils and a series of micro column studies to determine the increased effectiveness of enhanced in situ biotreatment techniques. Bacterial formulations capable of recolonizing waste soils and degrading residual contaminants are being tested extensively. Soil microcosm studies are also being undertaken to evaluate the effectiveness of bacterial and nutrient systems on target contaminants degradation and the conditions that promote biodegradation.

Comprehensive pilot demonstrations, planned to begin after completion of the bench-scale work, will verify the effectiveness of the treatment techniques and will provide design criteria, schedule, and budget for full-scale field work. The pilot demonstration will also verify the results of the micro column studies under actual field conditions.

# REMEDIATION OF HYDROCARBON-CONTAMINATED GROUNDWATER

**PROJECT LOCATION:**

California

**CLIENT:**

Confidential

**INDUSTRY:**

Chemical Solvent Manufacturer

**CONTAMINANTS:**

Chlorinated Hydrocarbons and Soluble Organics, Aromatic Compounds, Ketones, Alcohols, and Glycols

## PROBLEM:

Underground storage tanks containing chemical solvents have contributed to large-scale groundwater contamination with chlorinated hydrocarbon and soluble organic materials. An existing air stripping system was not effective in bringing the groundwater into compliance limits. The National Priority List site is subject to cleanup standards and discharge limits as *established by the regional office of the U.S. EPA and the California Regional Water Quality Control Board.*

## SOLUTION:

Ecova Corporation was contracted to operate a groundwater decontamination system using a two-step process employing air stripping in conjunction with a bioreactor system. This system, currently in operation by the client, combines physical and biological technologies to remove a complex mix of contaminant from site groundwater. The site is a chemical blending, storage, and distribution facility. Groundwater and soil investigations conducted previously revealed that the groundwater beneath the facility was contaminated with volatile organic compounds (VOCs) and soluble organic compounds including chlorinated hydrocarbons, aromatic compounds and various ketones, alcohols, and glycols. Ecova designed and constructed a bench-scale air stripper and conducted biological treatability studies in the corporate laboratories using water from the site. These preliminary tests provided essential information for design of the full-scale treatment system, such as expected stripping efficiency and biodegradation rates. the laboratory study also developed the microbial inoculum used in the full-scale field bioreactor.

The treatment system includes seven groundwater recovery wells and a hydraulic control system, an air stripper to remove VOCs of low solubility, and a biological treatment system to remove soluble organic compounds. The air stripper is a 35-ft high column with internal packing that increases air-to-liquid surface contact. Contaminated groundwater enters the top of the unit and forms a cascading film as it drops through the packing material. Simultaneously, air is blown upward from the bottom of the columns, thus "stripping" volatile hydrocarbon molecules from the water. The air stripper has a working capacity of 50 gallons per minute (gpm).

Following removal of the volatile organics, groundwater is transferred to the bioreactor for degradation of the soluble organics. The bioreactor is a 10,000-gallon tank seeded with a microorganism/nutrient inoculum specifically acclimated to biodegrade the remaining soluble organic contaminants. The bioreactor contains an agitator to provide aeration and instrumentation for monitoring contaminant levels and biodegradation. Ecova met with California regulatory agencies to gain approval of system design and achievable treatment levels.

The system initially operated on a batch discharge basis; the effluent was collected in tanks and discharged to the storm sewer only after sampling confirmed that all discharge requirements were met (chlorinated hydrocarbons <5 ppb and soluble organics <1 ppm). The system was put on continuous discharge to the storm sewer under a NPDES permit in July 1987, after sample results proved that contaminant levels were consistently reduced below discharge limits at a process flow rate of 18 gallons per minute.

# BIOREMEDIATION OF SOIL AND GROUNDWATER

**PROJECT LOCATION:**

North Dakota

**CLIENT:**

Confidential

**INDUSTRY:**

Agricultural Chemical Distribution

**CONTAMINANTS:**

Pesticides - 2,4-D, Alachlor, Trifluralin, Carbofuran, MCPA

## PROBLEM:

On April 7, 1987, a warehouse fire at a major agricultural distributorship ignited stored pesticides, completely destroying the facility. Firefighters responding to the scene used water to extinguish the flames, spreading pesticides into the surrounding soil, groundwater and a nearby creek.

## SOLUTION:

Ecova Corporation managed soil and groundwater bioremediation at the site. The remediation program involved extensive material handling, soil and material segregation, and the use of several biological techniques. Ecova designed and constructed a five-acre, clay-lined treatment bed at the site, and also delivered mobile bioslurry and liquid-phase bioremediation units to the treatment location. Contaminated soil from the burn site and along the length of the contaminated creek was excavated and transported to the treatment location. The soil was tested for contaminant levels, separated according to the extent of contamination, and prepared for treatment by the removal of rocks and debris.

Solid-phase treatment of approximately 12,000 cubic yards of less contaminated soil (containing less than 200 ppm of contaminants) was performed on the 5-acre, lined treatment bed. The soil was processed daily and a microbial inoculum was applied to assist the biological breakdown of the contaminants.

A mobile soil slurry bioreactor system was used to treat soils with contamination exceeding 200 ppm. This process consisted of aerobic treatment of soil mixed with water in 26,000 gallon bioreactor tanks. The slurry mixture was inoculated with pesticide-degrading bacteria and with nutrients that optimize the ability of bacteria to degrade the contaminants. The microbial inoculum and nutrient additions were developed in Ecova's corporate laboratories. Some groundwater was treated by pumping from subsurface contaminated areas and using it as makeup water in the soil biotreatment processes.

Groundwater was treated with innovative in situ bioremediation techniques which reduced the treatment time in half. An upgradient injection gallery was established to flush treated water and nutrients, as required, through the contaminated plume. Downgradient recovery wells and trenches recover treated groundwater. During treatment, the groundwater was monitored to guard against off-

site migration. During the winter of 1987, more than five million gallons of groundwater was treated. The site has been restored to its original condition and a site closure plan prepared in accordance with appropriate regulations.

## **APPENDIX A. Soil Boring Analysis**

## Soil Boring Analysis

Key information in the design and operation of any remediation program is the amount of contaminated material present to be treated and the level of contamination. To assess this information for the Time Oil site in Portland, Oregon, several sources of information were assessed. First, Ecova obtained samples of the contaminated soil for laboratory analysis. This data is reported in Appendix B, and indicates that an expected wide variation in PCP concentrations was observed with up to 2000 ppm PCP detected. We recognize that the soils with the highest PCP levels were deliberately buried to minimize exposure. The composite PCP concentration reported was 680 ppm.

Next, soil boring information provided by Time Oil was reviewed and analyzed. This detailed information provides PCP concentration for four vertical levels at each boring location within the sample grid. The reported levels were surface, and 4 ft, 7 ft, and 12-ft below grade. The bottom level is near the groundwater table.

Soil boring PCP concentration data also show wide variation, with hot spot concentrations of up to 8400 ppm. Determining average PCP concentrations within soil that shows nearly three orders of magnitude variation in concentration is a difficult task. It is clear from the data that much of the soil is well below 1000 ppm. Time Oil has estimated that the average concentrations may approximate 1500 ppm for the 2700 cubic yards that they estimate would be removed in excavating soil containing over 500 ppm.

Ecova used the Golden Software program SURFER to plot PCP concentrations for each soil boring horizon sampled by Time Oil. These plots agreed very well with similar plots provided by Time Oil. Using these plots, a hypothetical excavation (or "mine") plan was prepared to determine quantities of soil that would need to be removed and the overall PCP concentration in the excavated soil. These plots are illustrated in Appendix figures C-1 through C-4. The excavation plan was developed from the 12-ft plot and extended upward through the next three layers to remove the minimum amount of soil exceeding 500 ppm. The plot for the 12-ft horizon was assumed to be representative of soil in a layer from 12 ft below grade upward to 9.5 ft. The plot for 7 ft was assumed to represent soil in the 9.5 to 5.5 ft layer. The plot for 4' was assumed to represent soil in the 5.5 to 2 ft layer. Finally, the surface plot was assumed to represent the 2' to the surface layer.

The area of the "mine plan" contours for each layer were planimeted to determine area and subsequent volume of soil. Based upon this calculation, approximately 3440 cubic yards of contaminated soil must be excavated.

Next, the "volume" under the PCP concentration surface to the zero ppm level was determined using the SURFER volume calculation subroutine for each layer. Dividing that "volume" by the number of cubic yards within that layer yields the average PCP concentration for the soil within that layer. Calculating an average weighted by the amount of soil in each layer, the final average PCP concentration in the excavated soil was estimated to be 668 ppm. This agrees well with the composite analytical result and appears reasonable from close examination of the data.

Several points were observed in this study that are important to note. First, the depth of contaminated soil was assumed to be 12 ft. In actuality, the depth of contamination should extend deeper to the water table, especially in the area of the hot spots. This could increase the volume of soil that needs to be excavated by a considerable margin.

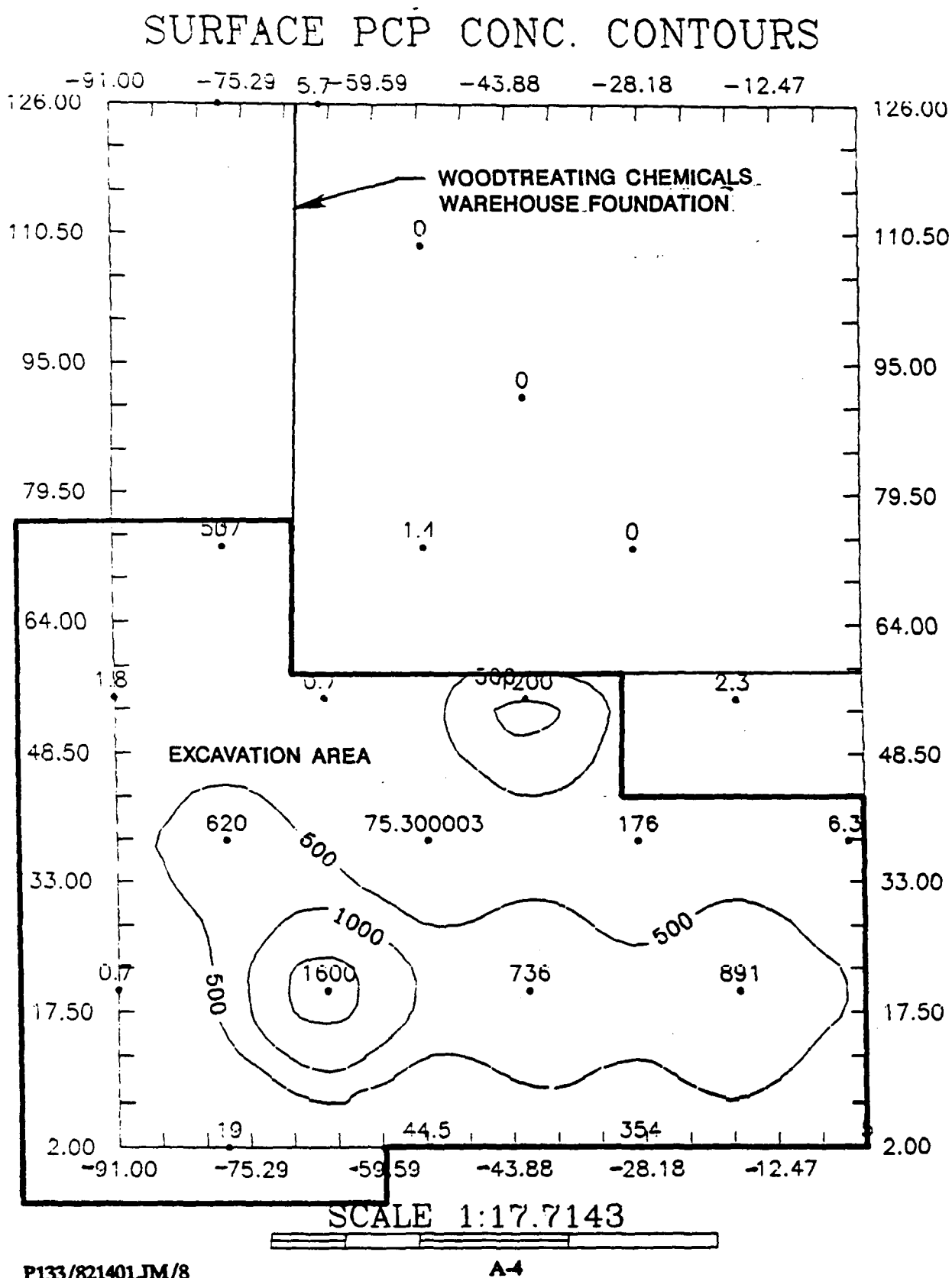
Second, the assumption was used that only soil exceeding 500 ppm would be excavated. From the soil boring data, the 500 ppm concentration isopleth was not completely contained in the plots at the 4 ft, 7 ft or the 12 ft depths. The cause of this was that PCP concentrations in the boring on the southern edge of the grid exceeded



500 ppm. This is especially important at the 12-ft depths since a much larger volume of soil must be excavated above this layer to get access to the lower layer. Since the 500 ppm contour was not bounded within the soil boring data, the exact quantity of soil exceeding 500 ppm cannot accurately be determined.

Finally, the use of a 500 ppm cutoff limit for PCP contamination may be considerably higher than that allowable by a regulatory agency. If a lower cutoff concentration were to be used, excavated soil volumes could be greatly increased.

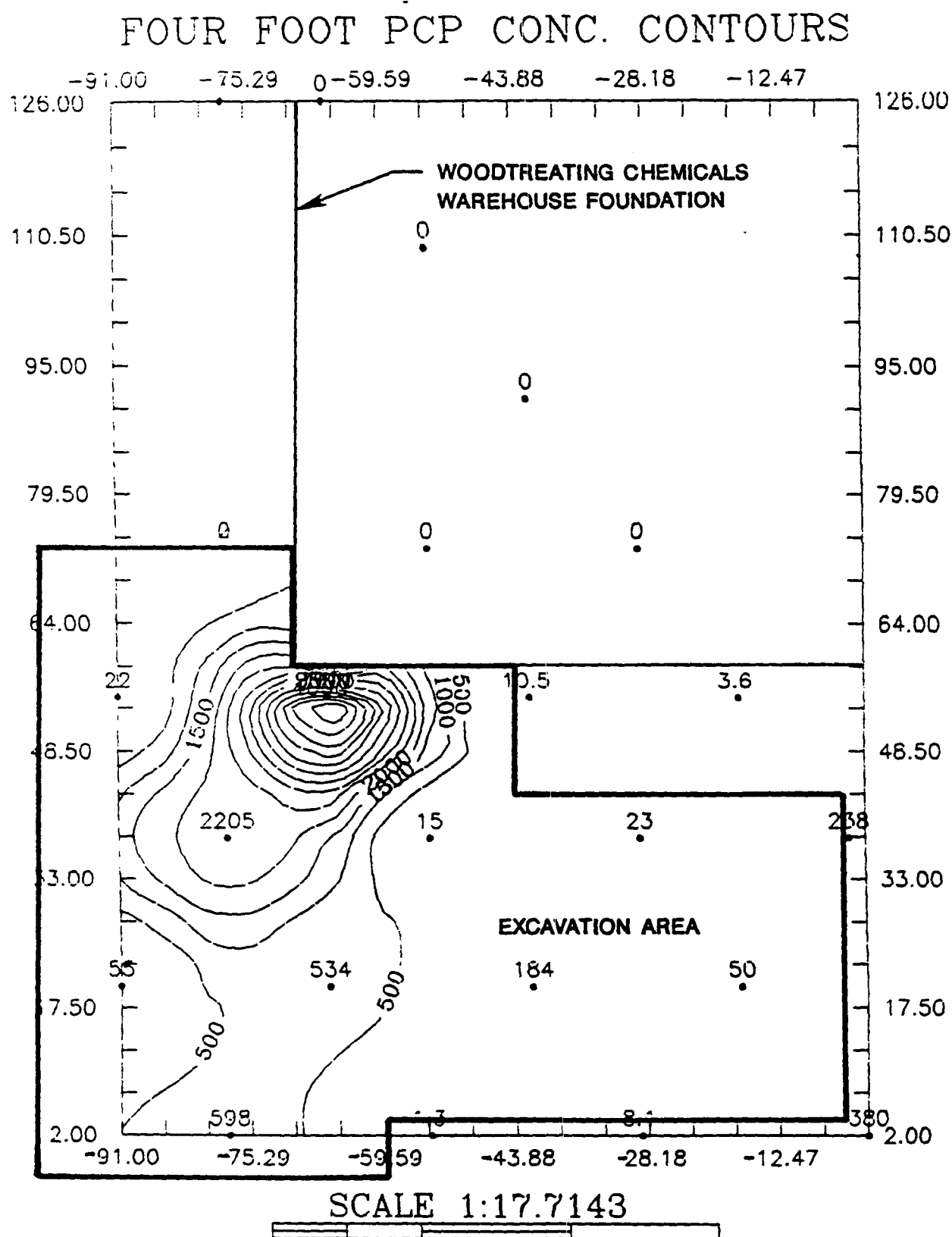
**FIGURE A-1.**  
**APPENDIX A-1. Excavation Plan 0-2' Depth**



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A-4

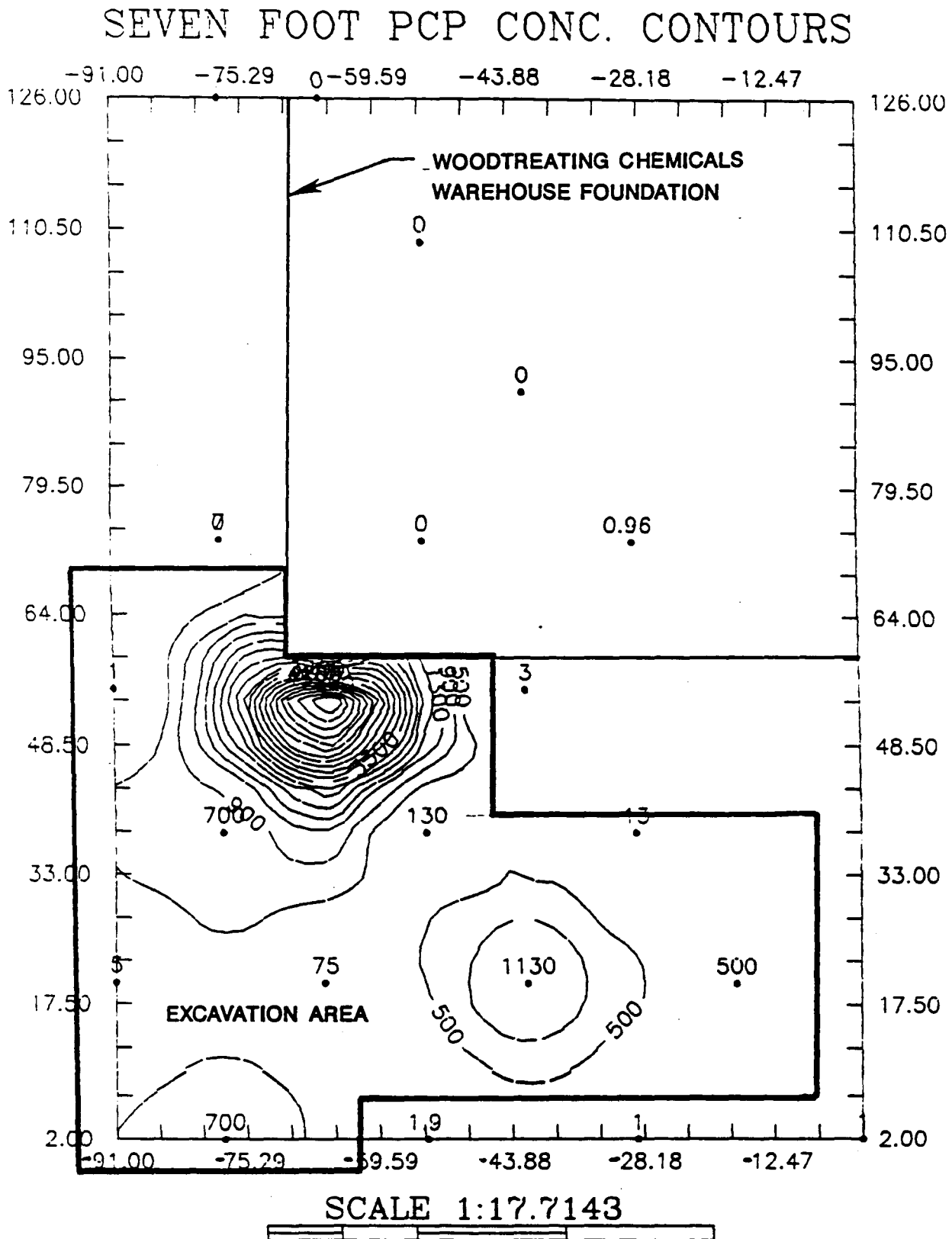
**FIGURE A-2.**  
**APPENDIX A-2. Excavation Plan 2'-5-1/2' Depth**



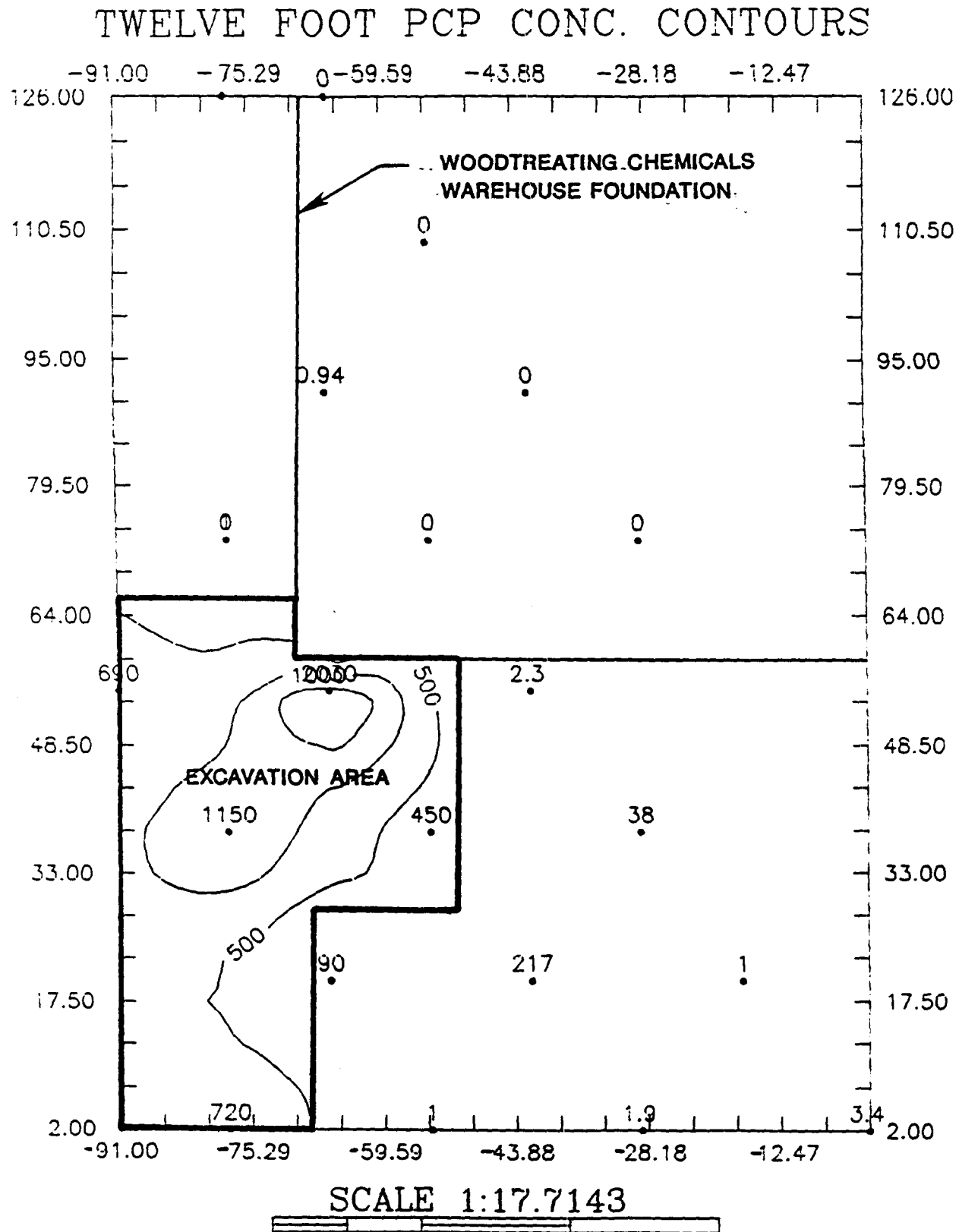
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A-5

**FIGURE A-3.**  
**APPENDIX A-3. Excavation Plan 5-1/2'-9-1/2' Depth**



**FIGURE A-4.**  
**APPENDIX A-4. Excavation Plan 9-1/2'-12' Depth**



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A-7

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# SOIL BORING ANALYSIS

TIME OIL - PORTLAND, OR  
PROJECT NO. 821401  
SEPTEMBER 1968  
SOIL BORING ANALYSIS

## PLANIMETER CALCS.-CONTOURS

CONTOUR MAP NAME	AREA (FT <sup>2</sup> )	VOLUME (FT <sup>3</sup> )	VOLUME (YD <sup>3</sup> )
SURFACE	2851.4	5702.9	211.2
4 FOOT	1832.5	6413.6	237.5
7 FOOT	3017.6	12070.4	447.1
12 FOOT	2283.6	11418.0	422.9
SUM	9985.1	35604.8	1318.7

## PLANIMETER CALCS.-MINE PLAN

DEPTH PROFILE (FT)	AREA (FT <sup>2</sup> )	VOLUME (FT <sup>3</sup> )	VOLUME (YD <sup>3</sup> )
0 - 2	9557.5	19114.9	708.0
2 - 5.5	8584.7	30046.4	1112.8
5.5 - 9.5	7069.8	28275.2	1047.2
9.5 - 12	3082.1	15410.2	570.7
SUM	28293.0	92846.7	3438.8

## CONCENTRATION VOLUME/LEVEL

DEPTH PROFILE (FT)	0 - 2	2 - 5.5	5.5 - 9.5	9.5 - 12
VOLUME CALC				
TRAP. RULE	370536.4	643602.9	758709.3	567716.0
SIMPSON'S RULE	349528.5	622479.8	779037.7	523789.1
3/8 SIMPS. RULE	356926.3	621843.4	754541.9	536940.5
AVERAGE	359030.4	629308.7	767096.0	542815.2
SEV	10710.0	12383.0	11831.0	22545.0
YARDS OF SOIL	708.0	1112.8	1047.2	570.7
PPM/YD <sup>3</sup>	507.1	565.5	732.5	951.1
	359030.4	629308.7	767096.0	542815.2
AVERAGE CONC./YD <sup>3</sup>	668.3 PPM			

## **APPENDIX B. Resumes**

P133/821401JM/8

B-1

BZTO104(e)011723

**MARK W. ANDERSON**  
**Project Manager**

Mr. Mark Anderson has over 13 years of experience with project management, environmental engineering and permitting assistance in waste management for manufacturing, chemical, petroleum, and state agency clients in the western United States and Alaska. As a project manager for Ecova, Mr. Anderson is responsible for overseeing the design and construction of onsite treatment systems and provides day-to-day management of their operation. He also provides the main point of contact for clients and is responsible for analyzing the requirements and status of field operations, site construction, laboratory support, and project safety.

**Education and Affiliations:**

M.B.A., Oklahoma City University, Oklahoma City, Oklahoma (High honors)  
B.S., Environmental Engineering, Montana College of Mineral Science & Technology, Butte, Montana, 1978  
B.S., Atmospheric Science, University of California, Davis, California, 1973  
P.E. No. 13740, State of Oklahoma

**Corporate Experience:**

1988 - Present	Ecova Corporation	Senior Project Manager
1985 - 1988	Dames & Moore, Inc.	Senior Project Manager
1981 - 1985	Kerr McGee Corp.	Senior Staff Engineer
1980 - 1981	Camp Dresser & McKee	Program Manager
1978 - 1980	Consolidated Cooper Co.	Director of Environmental Affairs
1974 - 1977	ASARCO, Inc.	Station Chief

**Related Project Experience**

- o Project Manager for the cleanup of diesel-contaminated soil at a former service station site in Tacoma, Washington.
- o Project Manager of the Remedial Investigation/ Feasibility Study (RI/FS) for a Superfund site (battery recycling facility and secondary lead smelter) in Portland, Oregon. Work included preparation of work plans; agency presentation and negotiations; sampling of wastes, surface and subsurface soil, groundwater, surface water, sediment and ambient air; identification and evaluation of appropriate remedial technologies which included conducting fixation/solidification tests of wastes and contaminated soils for inorganic contaminants; drilling of groundwater monitoring wells; and hydrogeologic modelling.
- o Project Manager for the cleanup of perchloroethylene contaminated soil using a 13-well extraction and treatment system.
- o Project Manager for an environmental audit of two aluminum master alloy manufacturing facilities in the States of Washington and Kentucky.



- o **Project Manager for a study to develop treatment, storage, and disposal alternatives for radioactive mixed wastes from active generating facilities at the Hanford Site, Richland, Washington. Work included identifying waste streams, assessing TSD technologies, and estimating costs for recommended alternatives.**
- o **Project Manager of a site study and feasibility analysis of a proposed gravel quarry and landfill operation in King County, Washington. Work included geological evaluation of the site and identification of permitting requirements.**
- o **As Project Engineer, evaluated wastewater treatment plant performance at the Boeing Corporation facility at Auburn, Washington.**
- o **As Environmental Engineer, assessed air, water, and hazardous waste compliance problems for chemical manufacturing plants in California, New Mexico, Idaho, Nevada, Mississippi, and Alabama; coal mining operations in Wyoming and Illinois; oil refineries in Oklahoma, Louisiana, California, and Texas; gas processing plants in Oklahoma, Texas, and North Dakota; nonferrous metal mining and smelting plants in Arizona and Montana; and nuclear facilities in New Mexico and Oklahoma.**

**ROBERT SCHECK**  
**Engineering Manager**

Robert Scheck has over 20 years of engineering and related experience with over 15 years of specialized experience in the environmental field, including hazardous waste treatment, air correction/flue gas desulfurization, and resource recovery. Mr. Scheck's management experience includes process design, technical management, construction management, and staff supervision.

**Education and Affiliations:**

B.S., Professional Degree in Extractive Metallurgy, Colorado School of Mines, 1967  
Business Management Program, Alexander Hamilton Institute

American Institute of Chemical Engineers  
American Institute of Mining Engineers

**Corporate Experience:**

1986 - Present	Ecova Corporation	Director of Engineering
1986 - 1986	Morrison-Knudsen Engineers	Process Design Manager
1982 - 1984	Sterns Catalytic Corp.	Project Manager
1967 - 1982	Sterns Roger Corp.	Project Manager/Project Engineer

**Related Project Experience**

- o Engineered a transportable slurry bioreactor system to remediate 1,000 yards of 2,4-D-contaminated soil. Horizontal reactors incorporated agitators, air spargers, interconnecting piping, and transfer/recirculation slurry pumps, and can be operated in series, parallel, batch, or continuously.
- o Designed granular activated carbon (GAC) absorption system to treat 100 GPM of 2,4-D-contaminated groundwater. Units incorporated programmable logic controls, alarm auto dialing, filtration, ozonation, GAC, and surge tankage. Units contain 3,000 lb of GAC in a transportable and explosion-proof container.
- o Performed technical management and supervision on a CERCLA project of approximately \$1 billion. Contaminants included nerve agents, pesticides, unexploded ordnance, heavy metals, miscellaneous organics, and fluoride in the groundwater. Initiated and coordinated remedial action planning which included groundwater treatment, incineration, landfill, and demolition.
- o Designed groundwater intercept system and prepared well water pump specifications for multiple pumps. Considered water hammer, incorporated freeze protection down to -50°F, and automatic drainage in case of power outage.
- o Coordinated a team investigation of hydrocarbon and TCA contamination of a shallow aquifer. The investigation continued with a feasibility study indicating bioreclamation to be the technology of choice. Work also included evaluation of a leaking underground storage tank.

- o Developed data base for the several thousand incidents of spills, releases, and discharges for the last 40 years over a 25-square-mile site. With consultants, developed a system for ranking the hazardous substances based on their hazardous nature and the specifics of the site.
- o Performed a feasibility study to remove chlorinated hydrocarbons from an aquifer and soils for a chemical plant. Detailed the groundwater intercept systems, GAC/air stripper, facility demolition, and soil decontamination.

**JOHN P. HANCOCK**  
**Project Engineer**

John Hancock is a project engineer specializing in the design of remediation systems for the cleanup of soil and groundwater contaminated with hazardous waste.

**Education:**

B.S., Petroleum Engineering, University of Tulsa, 1987  
B.S., Chemistry, Hendrix College, 1979  
Engineer-in-Training

**Corporate Experience:**

1988 - Present	Ecova Corporation	Project Engineer
1986	Conoco, Inc.	Student Engineer
1985	Rio Grande Drilling	Student Engineer
1981 - 1984	Arkansas Highway Dept.	Chemist
1979 - 1981	Arkansas Dept. of Pollution Control and Ecology	Chemist

**Related Project Experience:**

- o Project Engineer for an Ecova mobile treatment system designed to neutralize ash produced at a wood products manufacturing facility. Designed equipment and flow processes; coordinated with field crew during installation and operation; provided troubleshooting expertise.
- o Production Engineer responsible for maintaining production of oil and gas wells; maintenance and repair of high pressure pipelines and vessel, rotating equipment, and gas turbines; well testing; supervision and safety of contract employees on offshore platform.
- o Drilling Engineer responsible for maintenance of drilling rig, assembly of special drilling tools, maintenance and repair of drilling fluids and high pressure equipment including positive displacement pumps.
- o Chemist for quality control analysis of highway construction materials, water quality analysis for environmental projects, training of technicians, identification of general unknowns, physical and chemical testing of paint, extensive use of computer-interfaced analytical instruments (IR, AA, HPLC, UV-VIS).
- o Chemist for analysis of high volume particulate air samples, maintenance and calibration of continuous air chemistry monitors (NO<sub>x</sub>, SO<sub>x</sub>, HC, ozone), member of emergency response team (UV-VIS, IR, AA, Technician).

**JEFFREY POWELL**  
**Field Engineer**

Jeffrey Powell has eight years of experience in process system design, fabrication, startup, and operation. He is responsible for the design and fabrication of biological, chemical, and physical treatment systems and has developed modular pilot systems for onsite use for the remediation of hazardous waste sites. Systems developed by Mr. Powell include a modular fermenter/bioreactor; a pilot air stripper used to test process modifications and to predict cleanup levels achievable in full-scale operations; a modular air management system for an enclosed land treatment area; a bench-scale bioreactor to model energy requirements for a pilot scale bioreactor; and an oil/water separation system for the treatment of groundwater contaminated with diesel fuel. In addition, Mr. Powell is responsible for the installation and maintenance of systems installed onsite.

**Education:**

Challa Gardens Electrical & Mechanical Technical College, Australia,  
Graduated 1965

**Corporate Experience:**

1986 - Present	Ecova Corporation	Field Engineer
1981 - 1986	Jordon & Ste. Michelle Winery	Production and Maintenance Manager
1978 - 1981	Walter Reynell Winery	Maintenance Manager
1974 - 1978	Lawson & Jones Lithographers	Electrical Foreman
1970 - 1973	Drake & Gorham Construction	Electrical Supervisor
1968 - 1970	O'Donnell & Griffin Contract.	Electrical Foreman

**Related Project Experience:**

- o Managed the Ecova Facilities Engineering Shop. Supervised welders, metal workers, electricians, machinists and technicians in the fabrication of soil slurry systems, portable fermentation units, mobile treatment containers, oil/water separators, and carbon adsorption units.
- o Directed construction and maintenance of soil handling and microbiological equipment used to treat soil and groundwater at a Superfund site on the Gulf Coast.
- o Coordinated the installation and startup of soil treatment, bioslurry and groundwater treatment systems for the cleanup of a large chemical spill in North Dakota.
- o Designed and constructed soil handling equipment, including transportation units, conveyor systems, stackers, auto train loaders, and bucket wheel reclaimers.
- o Designed various microbiological systems, including reverse osmosis processes, and computer programs for sequencing production equipment.

- o **Managed maintenance of all production equipment including fermentation and production piping, heating, and refrigeration systems.**
- o **Directed maintenance and repair of tanks, piping, conveyor systems, heating and refrigeration systems, and production facilities. Designed and implemented computer program for sequencing production equipment.**

**WILLIAM MAHAFFEY, Ph.D.**  
**Project Biochemist**

William Mahaffey is a Senior Research Biochemist who specializes in microbial biochemistry. He is responsible for research efforts involving isolation and enrichment of microorganisms for promoting biodegradative abilities. Dr. Mahaffey conducts research on bacteria capable of degrading hydrocarbons, including heavy oils and tars, creosoles, and creosote; solvents; and a variety of other contaminants. He has 12 years of experience in the biodegradation of hazardous wastes.

**Education:**

Ph.D., Microbial Biochemistry, University of Texas at Austin, 1986  
M.S., Microbial Ecology, State University of New York at Brockport, 1978  
B.S., Microbiology, State University of New York at Brockport, 1976

**Corporate Experience:**

1987 - Present	Ecova Corporation	Senior Research Biochemist
1986 - 1987	Phillips Petroleum Co.	Senior Research Chemist
1976 - 1985	University of Texas	Research Assistant; Graduate Research Assistant

**Related Project Experience:**

- o Managed the development of microbiological operating procedures for field implementation in soil and ground water hazardous waste cleanup projects.
- o As a Research Biochemist, was responsible for use of chemostats and continuous culture techniques for the isolation of pesticide degrading microorganisms. Studied the effects of chlorinated compounds on microbial metabolism, specifically ketone and pentachlorophenol.
- o Developed research program on aromatic hydrocarbon metabolism by bacteria and fungi. Optimized fermentor growth conditions for maximum cell yield and enzymatic activity. Immobilized bacterial cells for biocatalysis. Used halogenated substrate carcinogenic polycyclic aromatic hydrocarbons. Isolated and characterized metabolic intermediates using HPLC, mass spectrometry, UV/VIS and CD spectroscopy, and nuclear magnetic resonance spectroscopy. Maintained laboratory microbial stock culture and metabolite collection.
- o Conducted graduate studies involving bacterial metabolism of dibenzothiophene and benz(a)anthracene. Isolated and characterized metabolic intermediates formed by whole cell biotransformation. Purified enzymes and clarified the metabolic pathways for both of the above substrates. Reported on the ring cleavage of a polycyclic aromatic hydrocarbon with more than three rings.

- o As a Staff Research Chemist, studied fermentation process development of genetically engineered yeast for the production of recombinant peptides and proteins. Analytical biochemistry work included characterization of recombinant proteins to determine host modifications or identity with the native protein. Dr. Mahaffey developed analytical techniques for monitoring production of recombinant proteins and peptides.



**JOHN KINSELLA, P.G.**  
**Vice President, Geosciences and Field Operations**

As Vice President of Geosciences and Field Operations, Mr. Kinsella directs the activities of the firm's engineers, hydrogeologists, and geophysicists in support of all remediation projects. He has ten years of experience as a professional hydrogeologist, including four years as regional manager of a major consulting firm. He has supervised and designed soil borings, well installations, aquifer tests, and borehole/surface geophysical surveys. Mr. Kinsella has managed Superfund RI/FS and RCRA projects, prepared hazardous and solid waste permit applications, and negotiated settlements for compliance orders.

**Health and Safety Training, Hazardous Waste Operations and Emergency Response; 29 CFR 1920.210**

**Education and Affiliations:**

M.Sc., Hydrogeology, University College/London, 1978  
B.A., Geology, Trinity College/Dublin, 1977

Professional Geologist (North and South Carolina)  
Certified Geologist (U.K.)

**Corporate Experience:**

1988 - Present	Ecova Corporation	V.P., Geosciences & Field Operations
1984 - 1988	Geraghty & Miller, Inc.	Associate & Office Manager
1981 - 1984	IT Corporation	Project Engineer
1978 - 1981	Thames Water Authority	Assistant Hydrogeologist

**Related Project Experience:**

- o Directed hydrogeologic evaluation of a closed 30 acre RCRA hazardous waste landfill. Defined landfill hydraulic characteristics via a water-balance and tracer methodologies. Lithium, oxygen isotope and barium tracers were used in conjunction with a historical photo search to map contaminant migration pathways and locate boring/well locations.
- o Installed shallow and deep monitoring well networks for hazardous waste facility in Emelle, Alabama. Deep wells (950 ft) had unique two-pump system to enable effective purging and sampling.
- o Assessed the extent of contamination resulting from the failure of an injection well at a chemical plant in New Orleans, Louisiana. Detailed samples revealed that pressurized contaminants had entered the aquifer at 200 ft below surface and penetrated two shallow water-bearing zones.
- o Prepared RCRA Part B closure document for Mississippi wood-treating plant. Also prepared a detailed report on PNA/PAH contaminant migration characteristics for client.

- o Evaluated the rate and extent of BTX contamination from a series of underground tanks at chemical manufacturing facility, Los Angeles, California. Floating free-phase product and dissolved plumes were mapped. Interceptor wells coupled with air stripping/carbon adsorption recommended.
- o Defined the rate and extent of organic and inorganic plumes originating from a spill and a closed RCRA landfill at an Illinois facility. The plumes (primarily chloride and VOCs) are moving at a rate of 300 ft/year through glacial gravels. Detailed computer modeling was used to design a 180-gpm recovery well system that discharged to an air stripper/carbon adsorption unit; Illinois EPA approved complete CAP.
- o Evaluated the source and extent of soil and groundwater contamination originating from subsurface tanks beneath a New Jersey warehouse.

**RODERICK CARR**  
**Director, Analytical Services**

Roderick Carr is a laboratory manager with 22 years of experience in technical project management, research and development, and chemical analysis of hazardous materials and wastes. He has published extensively on analytical methods development, specializing in the area of heavy metals. Mr. Carr manages daily laboratory operations for organic and inorganic analyses of wastes, soils, and water.

**Education:**

M.A.T., Environmental Chemistry Education, Harvard University, 1966.  
B.A., Physics/Chemistry Education, The George Washington University, 1965.

**Corporate Experience:**

1988 - Present	Ecova Corporation	Director, Analytical Services
1985 - 1988	RAMP Corporation	President
1979 - 1985	SCS Engineers	V.P., Pacific Northwest Operations
1976 - 1979	Versar, Inc.	Senior Project Manager
1966 - 1976	U.S. Naval Research Laboratory	Research Chemical Oceanographer

**Related Project Experience:**

- o Managed services for organic and inorganic sample analysis and classical wet chemistry. Managed the development and implementation of analytical services for site investigations and remediation activities. Responsible for the overall direction of laboratory growth, staff development, and regulatory compliance.
- o Responsible for daily operation of a trace element analytical laboratory at the U.S. Naval Research Laboratory, Washington, D.C.
- o Established a program in priority pollutant analysis for the U.S. Environmental Protection Agency. Managed the utilization of subcontractor laboratories in support of this project.
- o Responsible for administration of major projects from design through implementation. Interfaced with state and federal regulatory agencies to establish investigation criteria and guidelines. Developed special or new services for national analytical capabilities.
- o Led mercury task force, developed cold-vapor atomic absorption methodology for determining part-per-billion concentrations of mercury directly in seawater.
- o Developed methods for concentrating toxic heavy metals for analysis from marine waters.

- o Participated in laboratory studies which followed mercury through the food chain using carrier free radioactive mercury and clean-room procedures.
- o Reported directly to CEO for in-house environmental analysis chemical laboratory; managed teams of up to 15 professionals and staff. Provided technical support to EPA in its development of hazardous material regulations such as polychlorinated biphenyls (PCBs).

## **APPENDIX C. Ecova PCP Research**

**ISOLATION AND CHARACTERIZATION OF  
A PENTACHLOROPHENOL-DEGRADING MICROBIAL CONSORTIUM**

**Andrew J. Strehler, Donald R. Smallbeck, and Derek Ross, Ph.D**

**Ecova Corporation  
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**C-2**

## INTRODUCTION

Pentachlorophenol (PCP) is one of the most widely used biocides in the United States (U.S.). Approximately  $2.3 \times 10^6$  kilograms of PCP are manufactured per year in the U.S., about 80% of which is used as a pesticide by the wood-preserving industry (1). PCP is an inhibitor of oxidative phosphorylation, and is lethal to a wide variety of organisms, both plant and animal (2). Because of its toxicity and recalcitrance in the environment, PCP is considered a serious environmental pollutant, and has been placed on the U.S. Environmental Protection Agency's list of priority pollutants (3).

Ecova Corporation is currently developing bioremediation processes to clean-up contaminated soil and groundwater at a tie-treating plant in the Western United States. The site is 100 acres in size and listed under the Comprehensive Environmental Response and Compensation and Liability Act of 1980. An integral part of developing the bioremediation processes is the development of inocula which can degrade the contaminants present at the site. PCP is one of the major contaminants present at the site (Table 1).

The feasibility of using biological processes to treat PCP-contaminated wastewaters has been the subject of a number of investigations (4-6). Furthermore, Edgehill and Finn have demonstrated that the direct inoculation of PCP-degrading bacteria into PCP-contaminated soil may be a feasible method for minimizing the migration of PCP from wood treating sites into the environment (7). Ecova is performing a laboratory evaluation to assess the existing PCP biodegradation potential at the tie-treating plant, with a view to utilizing the existing PCP biodegradation potential to develop treatment systems to remediate the site. This chapter describes the isolation and partial characterization of a PCP-degrading microbial consortium, which will be used to clean-up PCP-contaminated

soil and groundwater during the site remediation.

#### ASSESSMENT OF THE EXISTING PCP BIODEGRADATION POTENTIAL AT THE SITE

The biodegradation of PCP is documented in the literature (1-13). Watanabe (12) and Suzuki (13) isolated Pseudomonas species which could degrade PCP. Crawford and his colleagues have isolated Flavobacterium strains that degrade PCP (2). While Finn and his colleagues have isolated a strain of Arthrobacter (ATCC 33790) which can utilize PCP as a sole source of carbon and energy (6, 11). A microbiological evaluation was performed to determine if PCP-degrading microorganisms were present in contaminated soil and groundwater at the tie-treating plant. Aerobic laboratory culture techniques were used to assess the existing PCP biodegradation potential in soil and groundwater samples removed from the site. Fifty-ml aliquots of basal medium (Table 2) were inoculated with 30% (w/v) or (v/v) of contaminated soil or groundwater, respectively. Inoculated flasks were incubated at 25°C for four weeks on a rotary shaker set at 165 rpm. Contaminant degradation was monitored by gas chromatography/mass spectroscopy (GC/MS) according to EPA method 625.

The microbiological evaluation demonstrated that the site contains microorganisms which can degrade the contaminants present at the tie-treating plant. The PCP biodegradation potential detected at the site was highly variable. The percent biodegradation of PCP ranged from 12% to 84%, with an average value of 63%. The highest PCP biodegradation potential was detected in the saturated soil, while the lowest PCP biodegradation potential was detected within area G at the tie-treating plant (Figure 1, Table 3). The data demonstrated that a significant PCP biodegradation potential does exist at the tie-



treating plant, but that this potential is not evenly distributed throughout the site.

## ISOLATION AND CHARACTERIZATION OF THE PCP-DEGRADING MICROBIAL CONSORTIUM

### Description of Continuous Culture Apparatus

The continuous culture apparatus illustrated in Figure 2 was used to isolate the PCP-degrading microbial consortium. The apparatus consisted of a 500-ml glass growth vessel, and 10 liter glass medium and effluent reservoirs. The growth vessel, and medium and effluent reservoirs were wrapped with aluminum foil to prevent photo-decomposition of the PCP. Air was supplied to the growth vessel at a rate of  $650 \text{ ml min}^{-1}$ , the agitation rate was 250 rpm, and the pH was maintained between 7.3 and 7.5 by the automatic addition of 10% (w/v) potassium hydroxide solution. The continuous culture was routinely operated at ambient temperature, approximately  $25^{\circ}\text{C}$ . At a retention time of 24 hours, the flow rate was  $0.347 \text{ ml min}^{-1}$ , and the dilution rate was  $0.042 \text{ hours}^{-1}$ . At a retention time of 12 hours, the flow rate and dilution rate were  $0.690 \text{ ml min}^{-1}$  and  $0.083 \text{ hours}^{-1}$ , respectively.

### Isolation of the PCP-Degrading Microbial Consortium

An inoculum was developed from the aerated shake flasks established during the microbial evaluation. The inoculum was added to the 500-ml growth vessel at a concentration of 2% (v/v), which was then immediately operated as a continuous culture. Initially basal medium containing 500 ppm nutrient broth and 10 ppm PCP was added to the growth

vessel to allow the inoculum to adapt to the PCP. The nutrient broth concentration was then gradually decreased to zero while the PCP concentration was increased to 50 ppm. PCP (Sigma Chemical Company) was supplied as the sodium salt. PCP concentration was measured by UV absorption at 320 nm (11). After 4 weeks of operation the consortium was able to utilize PCP as its sole source of carbon and energy, and greater than 98% of the added PCP was degraded (Table 4).

#### **Influence of PCP Concentration on the Stability of the Microbial Consortium**

After the chemostat had stabilized at an influent PCP concentration of 50 ppm, the PCP concentration was increased to 100 ppm and then subsequently to 150 ppm. At all of the PCP concentrations tested, greater than 98% of the added PCP was degraded (Table 5). GC/MS analysis demonstrated that the PCP concentration in the growth vessel was reduced to less than 300 ppb, and no intermediate metabolic products were detected. However, at a PCP concentration of 150 ppm, the chemostat became unstable and breakthrough of PCP occurred. Consequently, the chemostat was routinely operated at a PCP concentration of 100 ppm. Removal efficiencies of greater than 99% were maintained for several months in the continuous culture system, indicating that once established, the microbial consortium was very stable.

## Dechlorination of PCP by the Microbial Consortium

Dechlorination of PCP by the microbial consortium was determined by measuring the chloride concentration in the growth vessel. Chloride concentration was measured by mercuric nitrate titration (14). The microbial consortium completely dechlorinated PCP. Approximately five moles of chloride were released for every mole of PCP degraded (Table 6).

## Mineralization of PCP by the Microbial Consortium

Radiotracer techniques were used to demonstrate the mineralization of PCP by the microbial consortium. 5-ml aliquots were removed from the growth vessel and placed in the incubation vessel illustrated in Figure 3. Approximately 0.5 microcuries of uniformly labelled PCP (Pathfinder Laboratories) was added to each sample. Samples were incubated for twenty-four hours at 25°C. After which, 0.5-ml of 1% (v/v) sulfuric acid was added to terminate the reaction and drive carbon dioxide (CO<sub>2</sub>) out of solution. The released <sup>14</sup>C-labelled CO<sub>2</sub> was trapped on a filter paper wick containing 0.5-ml of phenethylamine, a CO<sub>2</sub> trapping agent. To maximize <sup>14</sup>CO<sub>2</sub> adsorption by the wick, the incubation vessel was gently shaken overnight in a 35°C water bath. The wick was subsequently removed and transferred to a scintillation vial containing 3-ml of Beckman Ready-Safe scintillation cocktail. <sup>14</sup>CO<sub>2</sub> was measured by liquid scintillation counting. <sup>14</sup>C-labelled compounds in the aqueous phase were measured by counting a 0.1-ml aliquot of that phase. All experiments were run in replicate. The experiments included acid-killed controls to monitor abiotic affects.

The radiotracer analysis demonstrated that the consortium mineralized the PCP to carbon dioxide. The average percent mineralization of  $^{14}\text{C}$ -labelled PCP to  $^{14}\text{CO}_2$  was 25% ( $n = 5$ ,  $\bar{x} = 25.3 \pm 1.5$ ).

#### Composition of the PCP-Degrading Microbial Consortium

The PCP-degrading microbial consortium consisted of six bacteria. The API Rapid NFT test procedure (15) was used to identify the bacteria to the species level. Five of the isolates were Pseudomonas species, the sixth member of the consortium could not be identified by the API NFT test procedure (Table 7). Pseudomonas species which can degrade PCP have been isolated previously by Watanabe (12) and Suzuki (13).

#### PCP Degradation by the Microbial Consortium in the Presence of Diesel Fuel

In addition to PCP, the contaminated soil and groundwater at the tie-treating plant contains a wide range of other contaminants, mostly polynuclear hydrocarbons (Table 1). To determine the selectivity of the microbial consortium for PCP, the continuous culture apparatus was operated with 100 ppm of PCP and 1,000 ppm of diesel fuel. Diesel fuel was selected because it is used as a carrier for PCP. The rate of PCP degradation in the presence of diesel fuel was similar to the rate achieved when PCP was supplied as the sole source of carbon and energy. Furthermore, the microbial consortium continued to completely dechlorinate the PCP. (Table 8). The data indicated that the microbial consortium selectively degraded the PCP, even in the presence of more readily utilizable carbon and energy sources. These studies are directly applicable to the development of

bioremediation systems for the treatment of PCP in complex waste environments.

## SUMMARY AND CONCLUSIONS

Continuous culture techniques were used to isolate a PCP-degrading microbial consortium from PCP-contaminated soil and groundwater at a tie-treating plant. The consortium utilized PCP as a sole source of carbon and energy at influent PCP concentrations of up to 150 ppm. However, at a PCP concentration of 150 ppm, the chemostat became unstable, and breakthrough of PCP occurred. Consequently, the chemostat was routinely operated at an influent PCP concentration of 100 ppm. At a concentration of 100 ppm, greater than 99% of the added PCP was degraded. GC/MS analysis demonstrated that the PCP concentration in the growth vessel was reduced to less than 300 ppb, and no intermediate metabolic products were detected. The consortium completely dechlorinated the PCP, five moles of chloride were released per mole of PCP. Radiotracer analysis demonstrated that the consortium mineralized the PCP to CO<sub>2</sub>. The microbial consortium consisted of six bacteria, five of which were Pseudomonas species. The consortium selectively degraded PCP, even in the presence of more readily utilizable carbon and energy sources (diesel fuel).

## ACKNOWLEDGEMENTS

We thank our colleagues in the Microbiology, Analytical Chemistry, Project Management, and Technical Writing divisions of Ecova Corporation for their contributions to this work.

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Table 1. Concentration of Predominant Site Contaminants

(Location)

Compound	Groundwater	Saturated Soil	Unsaturated Soil	Pond Bottom	Pond Periphery	Area G	Retort Area
Concentration (ppm)							
Acenaphthene	171	780	2.9	810	130	145	75
Anthracene	57	329	1.7	440	79	99	140
Dibenzofuran	105	445	1.4	310	63	59	27
Fluoranthene	216	903	3.5	1000	380	230	230
Naphthalene	239	1136	2.6	72	ND	11	ND
Pentachlorophenol	39	393	5.2	1300	363	190	234
Phenanthrene	389	1573	7.7	1600	587	320	151
Pyrene	145	680	9.4	670	350	205	230

Notes:

1. Contaminant concentrations were determined by GC/MS according to EPA method 625
2. ND = Not Determined



Table 2. Composition of Basal Medium

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$K_2HPO_4$	0.450 grams
$NaH_2PO_4 \cdot 2H_2O$	0.085 grams
$CaSO_4 \cdot 2H_2O$	0.025 grams
$MgSO_4 \cdot 7H_2O$	0.250 grams
$FeSO_4 \cdot 7H_2O$	0.005 grams
$(NH_4)_2SO_4$	0.500 grams
Deionized water	1000 ml
pH	7.3-7.5

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Table 3. Percent Reduction of the Most Abundant Contaminants in Soil and Water Samples

Compound	Groundwater	Saturated Soil	Unsaturated Soil	Pond Bottom	Pond Periphery	Area G	Retort Area	Mean
(% Reduction)								
Acenaphthene	91	84	85	77	79	73	86	84
Anthracene	86	84	72	96	77	86	90	82
Dibenzofuran	90	84	ND	97	90	95	90	89
Fluoranthene	67	82	51	76	81	61	33	67
Naphthalene	99	97	73	85	ND	79	ND	88
Pentachlorophenol	68	84	55	66	59	12	49	63
Phenanthrene	83	75	80	99	99	95	89	85
Pyrene	78	81	71	57	41	56	48	66

Notes:

1. Aerated shake flasks were incubated at 25°C for four weeks on a rotary shake set at 165 rpm
2. ND = Not Determined.

Table 4. PCP Degradation by the Microbial Consortium in the Presence of Nutrient Broth

Day	Influent PCP Concentration (ppm)	Effluent PCP Concentration (ppm)	% Reduction
2	50	26	48
6	50	9	82
7	50	<1	>98

Notes:

1. Day refers to number of days after increasing PCP concentration from 10 ppm to 50 ppm
2. Nutrient broth concentration was 500 ppm
3. PCP concentration was measured by UV absorption at 320 nm
4. Retention time was 24 hours
5. Flow rate was 0.347 ml min<sup>-1</sup>
6. Dilution rate was 0.042 hr<sup>-1</sup>

**Table 5. PCP Degradation by the Microbial Consortium With PCP as a Sole Source of Carbon and Energy**

<b>Influent PCP Concentration (ppm)</b>	<b>Effluent PCP Concentration (ppm)</b>	<b>% Reduction</b>
50	<1	>98
100	<1	>99
150	<1	>99

**Notes:**

1. PCP concentration was measured by UV absorption at 320 nm
2. Retention time was 12 hours
3. Flow rate was 0.690 ml min<sup>-1</sup>
4. Dilution rate was 0.083 hr<sup>-1</sup>

Table 6. Dechlorination of PCP by the Microbial Consortium with PCP as a Sole Source of Carbon and Energy

Influent PCP Concentration (ppm)	Theoretical Chloride Release (ppm)	Measured Chloride Release (ppm)	Moles of Chloride Released per Mole of PCP
100	66.5	74.0 n = 3 $\bar{x}$ = 74.0 $\pm$ 1.1	5.25

Notes:

1. PCP concentration was measured by UV absorption at 320 nm
2. Chloride concentration was measured by mercuric nitrate titration
3. Retention time was 24 hours
4. Flow rate was 0.347 ml min<sup>-1</sup>
5. Dilution rate was 0.042 hr<sup>-1</sup>

Table 7. Composition of PCP-Degrading Microbial Consortium

---

Pseudomonas aeruginosa

Pseudomonas fluorescens

Pseudomonas stutzeri

Pseudomonas maltophilia

Pseudomonas mendocina

Unidentified Gram-Negative Rod

---

Note:

Microorganisms were identified with the API Rapid NFT test procedure

Table 8. Dechlorination of PCP by the Microbial Consortium in the Presence of Diesel Fuel

Influent PCP Concentration (ppm)	Theoretical Chloride Release (ppm)	Measured Chloride Release (ppm)	Moles of Chloride Released per Mole of PCP
100	66.5	65.7 $n = 3$ $\bar{x} = 65.7$ $\pm 1.5$	4.75

Notes:

1. PCP concentration was measured by UV absorption at 320 nm
2. Chloride concentration was measured by mercuric nitrate titration
3. Diesel fuel concentration was 1000 ppm
4. Retention time was 24 hours
5. Flow rate was 0.347 ml min<sup>-1</sup>
6. Dilution rate was 0.042 hr<sup>-1</sup>

Figure 1. Site Map

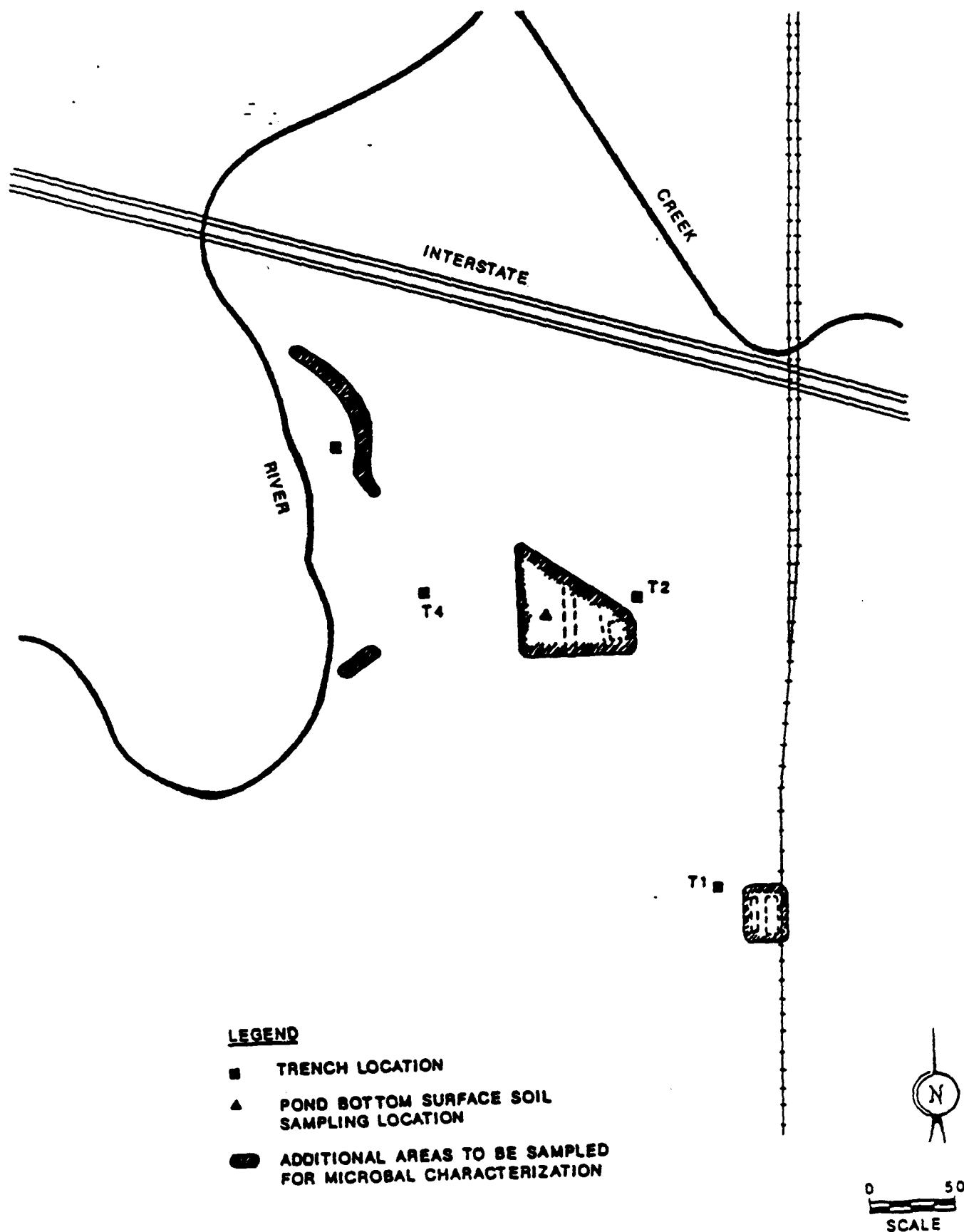




Figure 2. Continuous Culture Apparatus

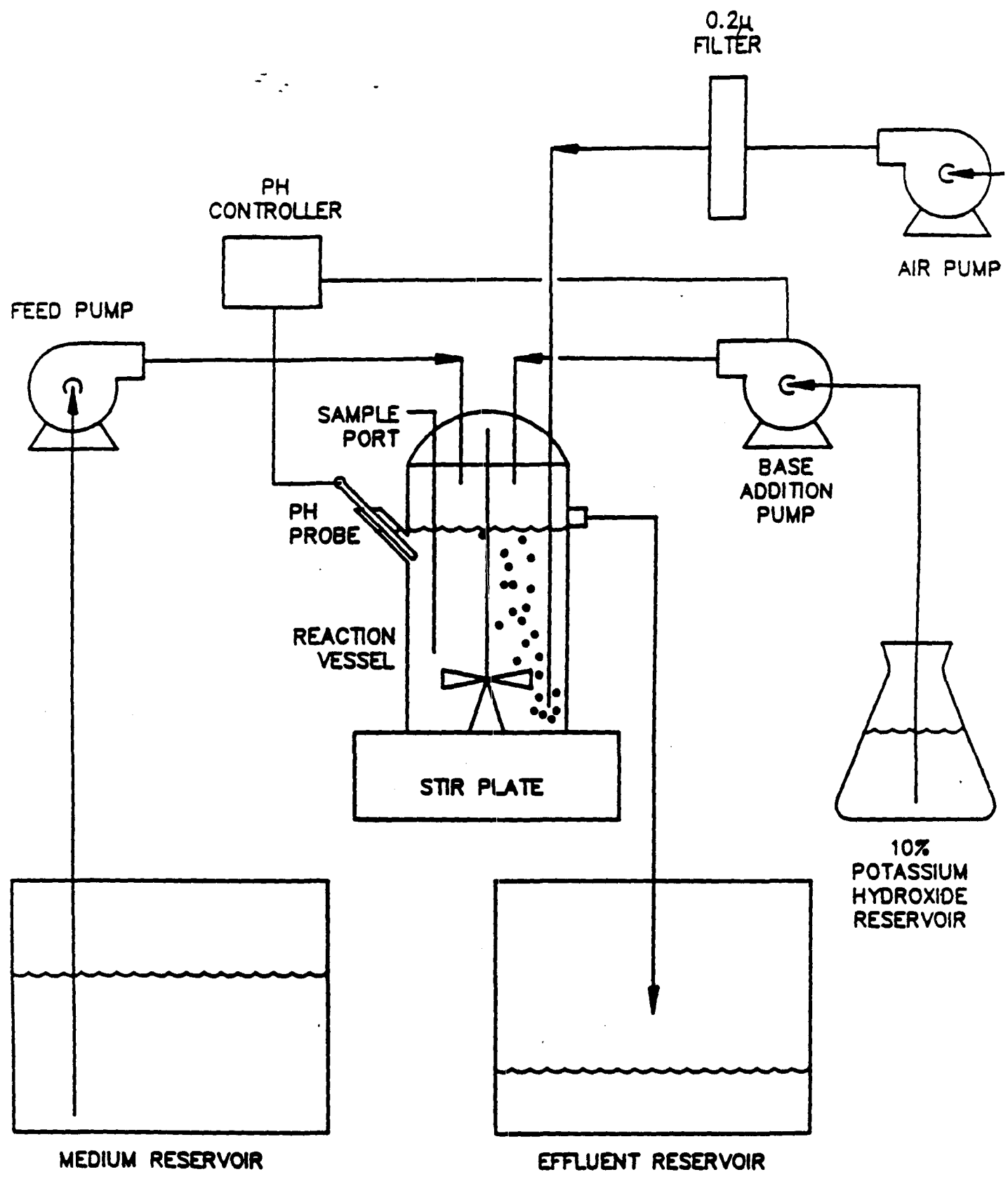
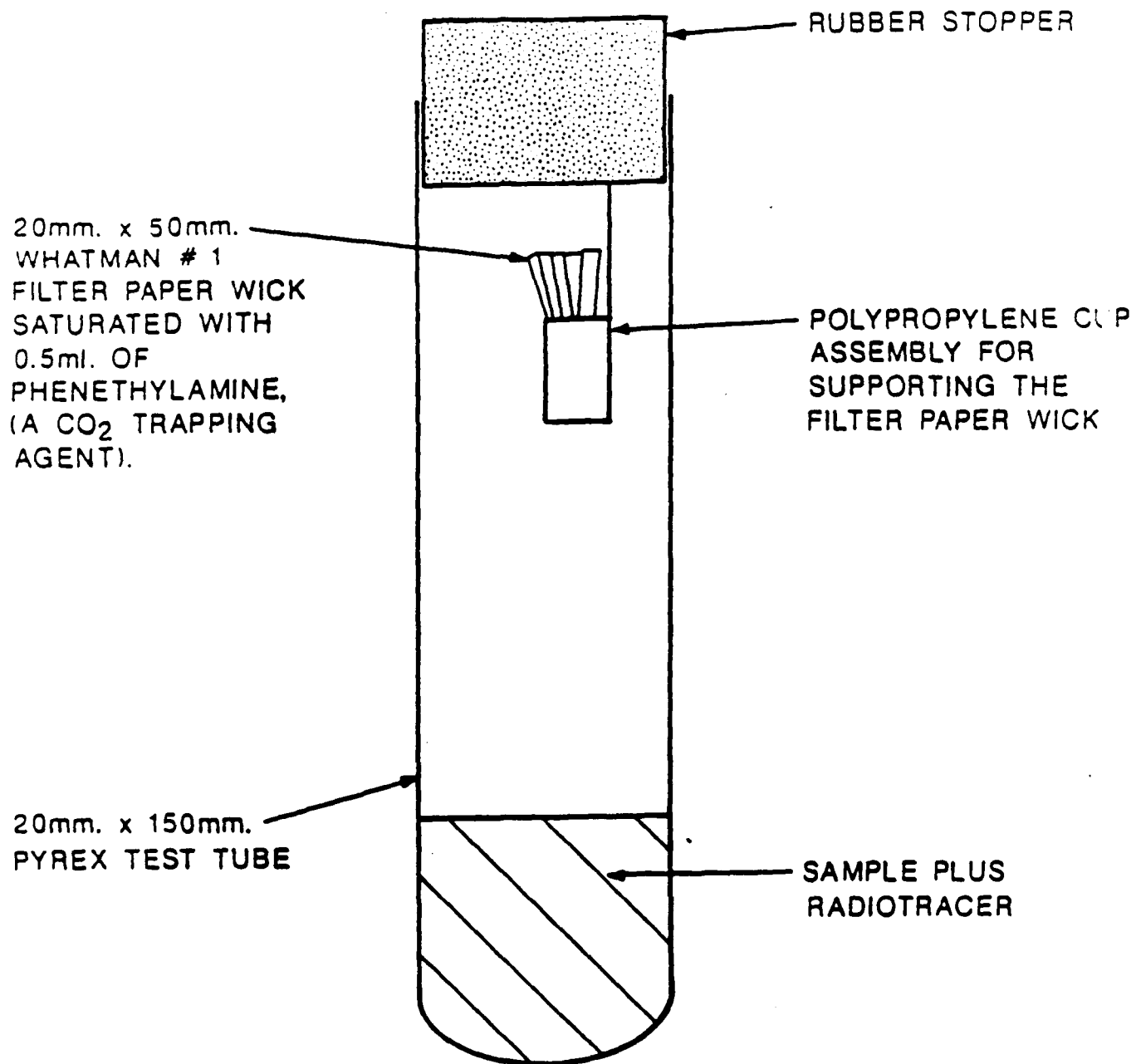


Figure 3. Incubation Vessel for Radiotracer Studies



## **APPENDIX D. Analytical Data Report**

ECOVA  
ANALYTICAL  
SERVICES

ANALYTICAL DATA REPORT NARRATIVE

To: B Mahaffey/M Anderson  
Project No: 821401

Date: 09/02/88  
EAS Batch No: 973

SAMPLE RECEIPT INFORMATION

No. of Samples: 6

Received on: 08/02/88

Comments: None.

DATA & DETECTION LIMIT COMMENTS/ADDITIONAL INFORMATION

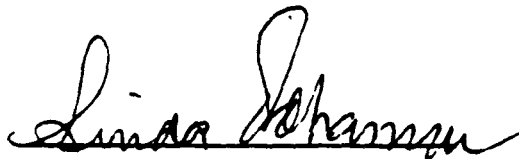
None.

Were any Nonconformance Memos submitted for these samples? ☒ Yes ☐ No

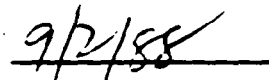
If yes, explain:

The method blank extracted with water sample EAS 973-01 contained phthalate contamination. There was no sample remaining to re-extract. The concentration for bis(2-ethylhexyl) phthalate in sample EAS 973-01 is considered a qualified value.

Signature:



Date:



68/1401-NAR.973

Project No: 821401

INORGANIC ANALYSIS REPORT

Customer #	Background	W-1, E-1, S-1, N-1
EAS #	973-02	973-C
Sample Description	Background Soil	Composite
Matrix	Soil	Soil
Date Received	08/02/88	08/02/88
Date Analyzed		

Parameters

Units

Total Organic Carbon	1060	7090	mg/kg
Nitrate (as NO <sub>3</sub> -N)	5.77	4.69	mg/kg
Nitrite (as NO <sub>2</sub> -N)	0.13	0.05	mg/kg
Ortho-Phosphorus (as PO <sub>4</sub> -P)	28	52	mg/kg

  
Data Release Authorized:

8-23-88  
Date

7/1401-IAR.973

**DATA REPORTING QUALIFIERS**

Project No: 821401

- B - Indicates compound was found in the associated blank as well as in the sample.
- J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.
- U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Water  
Concentration: Low Dilution Factor: 1.0000  
Sample wt/vol: 1000 ml  
Date Extracted: 08/05/88  
Date Analyzed: 8/30/88 14:58

Lab Sample ID: EAS973-01  
Customer Sample: Well B  
Sample Description: Well B  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*Kinda Williams*

C.A.S. Number		ug/L	C.A.S. Number		ug/L
108-95-2	Phenol	10. U	83-32-9	Acenaphthene	10. U
111-44-4	bis(2-Chloroethyl)ether	10. U	51-28-5	2,4-Dinitrophenol	50. U
95-57-8	2-Chlorophenol	10. U	100-02-7	4-Nitrophenol	50. U
541-73-1	1,3-Dichlorobenzene	10. U	132-64-9	Dibenzofuran	10. U
106-46-7	1,4-Dichlorobenzene	10. U	121-14-2	2,4-Dinitrotoluene	10. U
100-51-6	Benzyl alcohol	10. U	606-20-2	2,6-Dinitrotoluene	10. U
95-50-1	1,2-Dichlorobenzene	10. U	84-66-2	Diethylphthalate	10. U
95-48-7	2-Methylphenol	10. U	7005-72-3	4-Chlorophenyl-phenylether	10. U
538-32-9	bis(2-chloroisopropyl)ether	10. U	86-73-7	Fluorene	10. U
106-44-5	4-Methylphenol	10. U	100-01-6	4-Nitroaniline	50. U
621-64-7	N-Nitroso-di-n-propylamine	10. U	534-52-1	4,6-Dinitro-2-methylphenol	50. U
67-72-1	Hexachloroethane	10. U	86-30-6	N-Nitrosodiphenylamine (1)	10. U
98-95-3	Nitrobenzene	10. U	101-55-3	4-Bromophenyl-phenylether	10. U
78-59-1	Isophorone	10. U	118-74-1	Hexachlorobenzene	10. U
88-75-5	2-Nitrophenol	10. U	87-86-5	Pentachlorophenol	50. U
105-67-9	2,4-Dimethylphenol	10. U	85-01-8	Phenanthrene	10. U
65-85-0	Benzoic acid	50. U	120-12-7	Anthracene	10. U
111-91-1	bis(2-Chloroethoxy)Methane	10. U	84-74-2	Di-n-butylphthalate	2. J
120-83-2	2,4-Dichlorophenol	10. U	206-44-0	Fluoranthene	10. U
120-82-1	1,2,4-Trichlorobenzene	10. U	129-00-0	Pyrene	10. U
91-20-3	Naphthalene	10. U	85-68-7	Butylbenzylphthalate	10. U
106-47-8	4-Chloroaniline	10. U	91-94-1	3,3'-Dichlorobenzidine	20. U
87-68-3	Hexachlorobutadiene	10. U	56-55-3	Benzo(a)anthracene	10. U
59-50-7	4-Chloro-3-methylphenol	10. U	117-81-7	bis(2-Ethylhexyl)phthalate	3. JB
91-57-6	2-Methylnaphthalene	10. U	218-01-9	Chrysene	10. U
77-47-4	Hexachlorocyclopentadiene	10. U	117-84-0	Di-n-octylphthalate	10. U
88-06-2	2,4,6-Trichlorophenol	10. U	205-99-2	Benzo(b)fluoranthene	10. U
95-95-4	2,4,5-Trichlorophenol	50. U	207-08-9	Benzo(k)fluoranthene	10. U
91-58-7	2-Chloronaphthalene	10. U	50-32-8	Benzo(a)pyrene	10. U
88-74-4	2-Nitroaniline	50. U	193-39-5	Indeno(1,2,3-cd)pyrene	10. U
131-11-3	Dimethylphthalate	10. U	53-70-3	Dibenzo(a,h)anthracene	10. U
208-96-8	Acenaphthylene	10. U	191-24-2	Benzo(g,h,i)perylene	10. U
99-09-2	3-Nitroaniline	50. U			

(1)-Cannot be separated from diphenylamine

SEMIVOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 1.0000  
Sample wt/vol: 28.95 g Dry Weight  
Date Extracted: 08/08/88  
Date Analyzed: 8/29/88 17:05

Lab Sample ID: EAS973-02  
Customer Sample: Background  
Sample Description: Background Soil  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*Linda Shannon*

C.A.S. Number		ug/Kg		C.A.S. Number		ug/Kg	
108-95-2	Phenol	350.	U	83-32-9	Acenaphthene	350.	U
111-44-4	bis(2-Chloroethyl)ether	350.	U	51-28-5	2,4-Dinitrophenol	1700.	U
95-57-8	2-Chlorophenol	350.	U	100-02-7	4-Nitrophenol	1700.	U
541-73-1	1,3-Dichlorobenzene	350.	U	132-64-9	Dibenzofuran	350.	U
106-46-7	1,4-Dichlorobenzene	350.	U	121-14-2	2,4-Dinitrotoluene	350.	U
100-51-6	Benzyl alcohol	350.	U	606-20-2	2,6-Dinitrotoluene	350.	U
95-50-1	1,2-Dichlorobenzene	350.	U	84-66-2	Diethylphthalate	350.	U
95-48-7	2-Methylphenol	350.	U	7005-72-3	4-Chlorophenyl-phenylether	350.	U
9638-32-9	bis(2-chloroisopropyl)ether	350.	U	86-73-7	Fluorene	350.	U
106-44-5	4-Methylphenol	350.	U	100-01-6	4-Nitroaniline	1700.	U
621-64-7	N-Nitroso-di-n-propylamine	350.	U	534-52-1	4,6-Dinitro-2-methylphenol	1700.	U
67-72-1	Hexachloroethane	350.	U	86-30-6	N-Nitrosodiphenylamine (1)	350.	U
98-95-3	Nitrobenzene	350.	U	101-55-3	4-Bromophenyl-phenylether	350.	U
78-59-1	Isophorone	350.	U	118-74-1	Hexachlorobenzene	350.	U
88-75-5	2-Nitrophenol	350.	U	87-86-5	Pentachlorophenol	130.	J
105-67-9	2,4-Dimethylphenol	350.	U	85-01-8	Phenanthrene	86.	J
65-85-0	Benzoic acid	1700.	U	120-12-7	Anthracene	350.	U
111-91-1	bis(2-Chloroethoxy)Methane	350.	U	84-74-2	Di-n-butylphthalate	350.	U
120-83-2	2,4-Dichlorophenol	350.	U	206-44-0	Fluoranthene	290.	J
120-82-1	1,2,4-Trichlorobenzene	350.	U	129-00-0	Pyrene	520.	
91-20-3	Naphthalene	350.	U	85-68-7	Butylbenzylphthalate	350.	U
106-47-8	4-Chloroaniline	350.	U	91-94-1	3,3'-Dichlorobenzidine	690.	U
87-68-3	Hexachlorobutadiene	350.	U	56-55-3	Benzo(a)anthracene	150.	J
59-50-7	4-Chloro-3-methylphenol	350.	U	117-81-7	bis(2-Ethylhexyl)phthalate	350.	U
91-57-6	2-Methylnaphthalene	350.	U	218-01-9	Chrysene	280.	J
77-47-4	Hexachlorocyclopentadiene	350.	U	117-84-0	Di-n-octylphthalate	350.	U
88-06-2	2,4,6-Trichlorophenol	350.	U	205-99-2	Benzo(b)fluoranthene	200.	J
95-95-4	2,4,5-Trichlorophenol	1700.	U	207-08-9	Benzo(k)fluoranthene	160.	J
91-58-7	2-Chloronaphthalene	350.	U	50-32-8	Benzo(a)pyrene	170.	J
88-74-4	2-Nitroaniline	1700.	U	193-39-5	Indeno(1,2,3-cd)pyrene	150.	J
131-11-3	Dimethylphthalate	350.	U	53-70-3	Dibenzo(a,h)anthracene	350.	U
208-96-8	Acenaphthylene	350.	U	191-24-2	Benzo(g,h,i)perylene	180.	J
99-09-2	3-Nitroaniline	1700.	U				

(1)-Cannot be separated from diphenylamine

D-6

Form 1

7/85



SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 50.0000  
Sample wt/vol: 27.27 g  
Date Extracted: 08/08/88  
Date Analyzed: 8/31/88 15:07

Lab Sample ID: EAS973-03  
Customer Sample: W-1  
Sample Description: Soil Pile - Westside  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Date Release Authorized:

*Linda Sullivan*

C.A.S. Number	ug/Kg	C.A.S. Number	ug/Kg
108-95-2	Phenol 18000. U	83-32-9	Acenaphthene 18000. U
111-44-4	bis(2-Chloroethyl)ether 18000. U	51-28-5	2,4-Dinitrophenol 92000. U
95-57-8	2-Chlorophenol 18000. U	100-02-7	4-Nitrophenol 92000. U
541-73-1	1,3-Dichlorobenzene 18000. U	132-64-9	Dibenzofuran 18000. U
106-46-7	1,4-Dichlorobenzene 18000. U	121-14-2	2,4-Dinitrotoluene 18000. U
100-51-6	Benzyl alcohol 18000. U	606-20-2	2,6-Dinitrotoluene 18000. U
95-50-1	1,2-Dichlorobenzene 18000. U	84-66-2	Diethylphthalate 18000. U
95-48-7	2-Methylphenol 18000. U	7005-72-3	4-Chlorophenyl-phenylether 18000. U
39638-32-9	bis(2-chloroisopropyl)ether 18000. U	86-73-7	Fluorene 18000. U
106-44-5	4-Methylphenol 18000. U	100-01-6	4-Nitroaniline 92000. U
621-64-7	N-Nitroso-di-n-propylamine 18000. U	534-52-1	4,6-Dinitro-2-methylphenol 92000. U
67-72-1	Hexachloroethane 18000. U	86-30-6	N-Nitrosodiphenylamine (1) 18000. U
98-95-3	Nitrobenzene 18000. U	101-55-3	4-Bromophenyl-phenylether 18000. U
78-59-1	Isophorone 18000. U	118-74-1	Hexachlorobenzene 18000. U
88-75-5	2-Nitrophenol 18000. U	87-86-5	Pentachlorophenol 250000
105-67-9	2,4-Dimethylphenol 18000. U	85-01-8	Phenanthrene 18000. U
65-85-0	Benzoic acid 92000. U	120-12-7	Anthracene 18000. U
111-91-1	bis(2-Chloroethoxy)Methane 18000. U	84-74-2	Di-n-butylphthalate 18000. U
120-83-2	2,4-Dichlorophenol 18000. U	206-44-0	Fluoranthene 18000. U
120-82-1	1,2,4-Trichlorobenzene 18000. U	129-00-0	Pyrene 18000. U
91-20-3	Naphthalene 18000. U	85-68-7	Butylbenzylphthalate 18000. U
106-47-8	4-Chloroaniline 18000. U	91-94-1	3,3'-Dichlorobenzidine 37000. U
87-68-3	Hexachlorobutadiene 18000. U	56-55-3	Benzo(a)anthracene 18000. U
59-50-7	4-Chloro-3-methylphenol 18000. U	117-81-7	bis(2-Ethylhexyl)phthalate 18000. U
91-57-6	2-Methylnaphthalene 18000. U	218-01-9	Chrysene 18000. U
77-47-4	Hexachlorocyclopentadiene 18000. U	117-84-0	Di-n-octylphthalate 18000. U
88-06-2	2,4,6-Trichlorophenol 18000. U	205-99-2	Benzo(b)fluoranthene 18000. U
95-95-4	2,4,5-Trichlorophenol 92000. U	207-08-9	Benzo(k)fluoranthene 18000. U
91-58-7	2-Chloronaphthalene 18000. U	50-32-8	Benzo(a)pyrene 18000. U
88-74-4	2-Nitroaniline 92000. U	193-39-5	Indeno(1,2,3-cd)pyrene 18000. U
131-11-3	Dimethylphthalate 18000. U	53-70-3	Dibenzo(a,h)anthracene 18000. U
208-96-8	Acenaphthylene 18000. U	191-24-2	Benzo(g,h,i)perylene 18000. U
99-09-2	3-Nitroaniline 92000. U		

(1)-Cannot be separated from diphenylamine.

D-7

Form 1

7/85

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 500.000  
Sample wt/vol: 27.57 g  
Date Extracted: 08/08/88  
Date Analyzed: 8/31/88 16:12

Lab Sample ID: EAS973-04  
Customer Sample: E-1  
Sample Description: Soil Pile - Eastside  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*Linda P. [Signature]*

C.A.S. Number		ug/Kg		C.A.S. Number		ug/Kg
108-95-2	Phenol	180000	U	83-32-9	Acenaphthene	180000 U
111-44-4	bis(2-Chloroethyl)ether	180000	U	51-28-5	2,4-Dinitrophenol	910000 U
95-57-8	2-Chlorophenol	180000	U	100-02-7	4-Nitrophenol	910000 U
541-73-1	1,3-Dichlorobenzene	180000	U	132-64-9	Dibenzofuran	180000 U
106-46-7	1,4-Dichlorobenzene	180000	U	121-14-2	2,4-Dinitrotoluene	180000 U
100-51-6	Benzyl alcohol	180000	U	606-20-2	2,6-Dinitrotoluene	180000 U
95-50-1	1,2-Dichlorobenzene	180000	U	84-66-2	Diethylphthalate	180000 U
95-48-7	2-Methylphenol	180000	U	7005-72-3	4-Chlorophenyl-phenylether	180000 U
9638-32-9	bis(2-chloroisopropyl)ether	180000	U	86-73-7	Fluorene	180000 U
106-44-5	4-Methylphenol	180000	U	100-01-6	4-Nitroaniline	910000 U
621-64-7	N-Nitroso-di-n-propylamine	180000	U	534-52-1	4,6-Dinitro-2-methylphenol	910000 U
67-72-1	Hexachloroethane	180000	U	86-30-6	N-Nitrosodiphenylamine (1)	180000 U
98-95-3	Nitrobenzene	180000	U	101-55-3	4-Bromophenyl-phenylether	180000 U
78-59-1	Isophorone	180000	U	118-74-1	Hexachlorobenzene	180000 U
88-75-5	2-Nitrophenol	180000	U	87-86-5	Pentachlorophenol	2000000
105-67-9	2,4-Dimethylphenol	180000	U	85-01-8	Phenanthrene	180000 U
65-85-0	Benzoic acid	910000	U	120-12-7	Anthracene	180000 U
111-91-1	bis(2-Chloroethoxy)Methane	180000	U	84-74-2	Di-n-butylphthalate	180000 U
120-83-2	2,4-Dichlorophenol	180000	U	206-44-0	Fluoranthene	180000 U
120-82-1	1,2,4-Trichlorobenzene	180000	U	129-00-0	Pyrene	180000 U
91-20-3	Naphthalene	180000	U	85-68-7	Butylbenzylphthalate	180000 U
106-47-8	4-Chloroaniline	180000	U	91-94-1	3,3'-Dichlorobenzidine	360000 U
87-68-3	Hexachlorobutadiene	180000	U	56-55-3	Benzo(a)anthracene	180000 U
59-50-7	4-Chloro-3-methylphenol	180000	U	117-81-7	bis(2-Ethylhexyl)phthalate	180000 U
91-57-6	2-Methylnaphthalene	180000	U	218-01-9	Chrysene	180000 U
77-47-4	Hexachlorocyclopentadiene	180000	U	117-84-0	Di-n-octylphthalate	180000 U
88-06-2	2,4,6-Trichlorophenol	180000	U	205-99-2	Benzo(b)fluoranthene	180000 U
95-95-4	2,4,5-Trichlorophenol	910000	U	207-08-9	Benzo(k)fluoranthene	180000 U
91-58-7	2-Chloronaphthalene	180000	U	50-32-8	Benzo(a)pyrene	180000 U
88-74-4	2-Nitroaniline	910000	U	193-39-5	Indeno(1,2,3-cd)pyrene	180000 U
131-11-3	Dimethylphthalate	180000	U	53-70-3	Dibenzo(a,h)anthracene	180000 U
208-96-8	Acenaphthylene	180000	U	191-24-2	Benzo(g,h,i)perylene	180000 U
99-09-2	3-Nitroaniline	910000	U			

(1)-Cannot be separated from diphenylamine

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 1.0000  
Sample wt/vol: 27.36 g Dry Weight  
Date Extracted: 08/08/88  
Date Analyzed: 8/29/88 18:12

Lab Sample ID: EAS973-05  
Customer Sample: S-1  
Sample Description: Soil Pile - Southside  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*[Signature]*

C.A.S. Number	ug/Kg	C.A.S. Number	ug/Kg
108-95-2 Phenol	370. U	83-32-9 Acenaphthene	370. U
111-44-4 bis(2-Chloroethyl)ether	370. U	51-28-5 2,4-Dinitrophenol	1800. U
95-57-8 2-Chlorophenol	370. U	100-02-7 4-Nitrophenol	1800. U
541-73-1 1,3-Dichlorobenzene	370. U	132-64-9 Dibenzofuran	370. U
106-46-7 1,4-Dichlorobenzene	370. U	121-14-2 2,4-Dinitrotoluene	370. U
100-51-6 Benzyl alcohol	370. U	606-20-2 2,6-Dinitrotoluene	370. U
95-50-1 1,2-Dichlorobenzene	370. U	84-66-2 Diethylphthalate	370. U
95-48-7 2-Methylphenol	370. U	7005-72-3 4-Chlorophenyl-phenylether	370. U
638-32-9 bis(2-chloroisopropyl)ether	370. U	86-73-7 Fluorene	370. U
106-44-5 4-Methylphenol	370. U	100-01-6 4-Nitroaniline	1800. U
621-64-7 N-Nitroso-di-n-propylamine	370. U	534-52-1 4,6-Dinitro-2-methylphenol	1800. U
67-72-1 Hexachloroethane	370. U	86-30-6 N-Nitrosodiphenylamine (1)	370. U
98-95-3 Nitrobenzene	370. U	101-55-3 4-Bromophenyl-phenylether	370. U
78-59-1 Isophorone	370. U	118-74-1 Hexachlorobenzene	370. U
88-75-5 2-Nitrophenol	370. U	87-86-5 Pentachlorophenol	2200.
105-67-9 2,4-Dimethylphenol	370. U	85-01-8 Phenanthrene	370. U
65-85-0 Benzoic acid	1800. U	120-12-7 Anthracene	370. U
111-91-1 bis(2-Chloroethoxy)Methane	370. U	84-74-2 Di-n-butylphthalate	370. U
120-83-2 2,4-Dichlorophenol	370. U	206-44-0 Fluoranthene	44. J
120-82-1 1,2,4-Trichlorobenzene	370. U	129-00-0 Pyrene	80. J
91-20-3 Naphthalene	370. U	85-68-7 Butylbenzylphthalate	370. U
106-47-8 4-Chloroaniline	370. U	91-94-1 3,3'-Dichlorobenzidine	730. U
87-68-3 Hexachlorobutadiene	370. U	56-55-3 Benzo(a)anthracene	37. J
59-50-7 4-Chloro-3-methylphenol	370. U	117-81-7 bis(2-Ethylhexyl)phthalate	40. J
91-57-6 2-Methylnaphthalene	370. U	218-01-9 Chrysene	82. J
77-47-4 Hexachlorocyclopentadiene	370. U	117-84-0 Di-n-octylphthalate	370. U
88-06-2 2,4,6-Trichlorophenol	370. U	205-99-2 Benzo(b)fluoranthene	50. J
95-95-4 2,4,5-Trichlorophenol	1800. U	207-08-9 Benzo(k)fluoranthene	38. J
91-58-7 2-Chloronaphthalene	370. U	50-32-8 Benzo(a)pyrene	370. U
88-74-4 2-Nitroaniline	1800. U	193-39-5 Indeno(1,2,3-cd)pyrene	370. U
131-11-3 Dimethylphthalate	370. U	53-70-3 Dibenzo(a,h)anthracene	370. U
208-96-8 Acenaphthylene	370. U	191-24-2 Benzo(g,h,i)perylene	370. U
79-09-2 3-Nitroaniline	1800. U		

(1)-Cannot be separated from diphenylamine  
D-9

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 200.000  
Sample wt/vol: 27.72 g Dry Weight  
Date Extracted: 08/08/88  
Date Analyzed: 8/29/88 20:27

Lab Sample ID: EAS973-06  
Customer Sample: M-1  
Sample Description: Soil Pile - Northside  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*Linda Schuman*

C.A.S. Number	ug/Kg	C.A.S. Number	ug/Kg
108-95-2 Phenol	72000. U	83-32-9 Acenaphthene	72000. U
111-44-4 bis(2-Chloroethyl)ether	72000. U	51-28-5 2,4-Dinitrophenol	360000. U
95-57-8 2-Chlorophenol	72000. U	100-02-7 4-Nitrophenol	360000. U
541-73-1 1,3-Dichlorobenzene	72000. U	132-64-9 Dibenzofuran	72000. U
106-46-7 1,4-Dichlorobenzene	72000. U	121-14-2 2,4-Dinitrotoluene	72000. U
100-51-6 Benzyl alcohol	72000. U	606-20-2 2,6-Dinitrotoluene	72000. U
95-50-1 1,2-Dichlorobenzene	72000. U	84-66-2 Diethylphthalate	72000. U
95-48-7 2-Methylphenol	72000. U	7005-72-3 4-Chlorophenyl-phenylether	72000. U
538-32-9 bis(2-chloroisopropyl)ether	72000. U	86-73-7 Fluorene	72000. U
106-44-5 4-Methylphenol	72000. U	100-01-6 4-Nitroaniline	360000. U
621-64-7 N-Nitroso-di-n-propylamine	72000. U	534-52-1 4,6-Dinitro-2-methylphenol	360000. U
67-72-1 Hexachloroethane	72000. U	86-30-6 N-Nitrosodiphenylamine (1)	72000. U
98-95-3 Nitrobenzene	72000. U	101-55-3 4-Bromophenyl-phenylether	72000. U
78-59-1 Isophorone	72000. U	118-74-1 Hexachlorobenzene	72000. U
88-75-5 2-Nitrophenol	72000. U	87-86-5 Pentachlorophenol	720000. U
105-67-9 2,4-Dimethylphenol	72000. U	85-01-8 Phenanthrene	72000. U
65-85-0 Benzoic acid	360000. U	120-12-7 Anthracene	72000. U
111-91-1 bis(2-Chloroethoxy)Methane	72000. U	84-74-2 Di-n-butylphthalate	72000. U
120-83-2 2,4-Dichlorophenol	72000. U	206-44-0 Fluoranthene	72000. U
120-82-1 1,2,4-Trichlorobenzene	72000. U	129-00-0 Pyrene	72000. U
91-20-3 Naphthalene	72000. U	85-68-7 Butylbenzylphthalate	72000. U
106-47-8 4-Chloroaniline	72000. U	91-94-1 3,3'-Dichlorobenzidine	140000. U
87-68-3 Hexachlorobutadiene	72000. U	56-55-3 Benzo(a)anthracene	72000. U
59-50-7 4-Chloro-3-methylphenol	72000. U	117-81-7 bis(2-Ethylhexyl)phthalate	72000. U
91-57-6 2-Methylnaphthalene	72000. U	218-01-9 Chrysene	72000. U
77-47-4 Hexachlorocyclopentadiene	72000. U	117-84-0 Di-n-octylphthalate	72000. U
88-06-2 2,4,6-Trichlorophenol	72000. U	205-99-2 Benzo(b)fluoranthene	72000. U
95-95-4 2,4,5-Trichlorophenol	360000. U	207-08-9 Benzo(k)fluoranthene	72000. U
91-58-7 2-Chloronaphthalene	72000. U	50-32-8 Benzo(a)pyrene	72000. U
88-74-4 2-Nitroaniline	360000. U	193-39-5 Indeno(1,2,3-cd)pyrene	72000. U
131-11-3 Dimethylphthalate	72000. U	53-70-3 Dibenzo(a,h)anthracene	72000. U
208-96-8 Acenaphthylene	72000. U	191-24-2 Benzo(g,h,i)perylene	72000. U
99-09-2 3-Nitroaniline	360000. U		

(1)-Cannot be separated from diphenylamine

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 200.000  
Sample wt/vol: 27.48 g Dry Weight  
Date Extracted: 08/08/88  
Date Analyzed: 8/29/88 21:33

Lab Sample ID: EAS973-C  
Customer Sample: W-1, E-1, S-1, N-1  
Sample Description: Composite  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*[Signature]*

C.A.S. Number		ug/Kg		C.A.S. Number		ug/Kg	
108-95-2	Phenol	73000.	U	83-32-9	Acenaphthene	73000.	U
111-44-4	bis(2-Chloroethyl)ether	73000.	U	51-28-5	2,4-Dinitrophenol	360000.	U
95-57-8	2-Chlorophenol	73000.	U	100-02-7	4-Nitrophenol	360000.	U
541-73-1	1,3-Dichlorobenzene	73000.	U	132-64-9	Dibenzofuran	73000.	U
106-46-7	1,4-Dichlorobenzene	73000.	U	121-14-2	2,4-Dinitrotoluene	73000.	U
100-51-6	Benzyl alcohol	73000.	U	606-20-2	2,6-Dinitrotoluene	73000.	U
95-50-1	1,2-Dichlorobenzene	73000.	U	84-66-2	Diethylphthalate	73000.	U
95-48-7	2-Methylphenol	73000.	U	7005-72-3	4-Chlorophenyl-phenylether	73000.	U
39638-32-9	bis(2-chloroisopropyl)ether	73000.	U	86-73-7	Fluorene	73000.	U
76-44-5	4-Methylphenol	73000.	U	100-01-6	4-Nitroaniline	360000.	U
21-64-7	N-Nitroso-di-n-propylamine	73000.	U	534-52-1	4,6-Dinitro-2-methylphenol	360000.	U
67-72-1	Hexachloroethane	73000.	U	86-30-6	N-Nitrosodiphenylamine (1)	73000.	U
98-95-3	Nitrobenzene	73000.	U	101-55-3	4-Bromophenyl-phenylether	73000.	U
78-59-1	Isophorone	73000.	U	118-74-1	Hexachlorobenzene	73000.	U
88-75-5	2-Nitrophenol	73000.	U	87-86-5	Pentachlorophenol	680000.	
105-67-9	2,4-Dimethylphenol	73000.	U	85-01-8	Phenanthrene	73000.	U
65-85-0	Benzoic acid	360000.	U	120-12-7	Anthracene	73000.	U
111-91-1	bis(2-Chloroethoxy)Methane	73000.	U	84-74-2	Di-n-butylphthalate	73000.	U
120-83-2	2,4-Dichlorophenol	73000.	U	206-44-0	Fluoranthene	73000.	U
120-82-1	1,2,4-Trichlorobenzene	73000.	U	129-00-0	Pyrene	73000.	U
91-20-3	Naphthalene	73000.	U	85-68-7	Butylbenzylphthalate	73000.	U
106-47-8	4-Chloroaniline	73000.	U	91-94-1	3,3'-Dichlorobenzidine	150000.	U
87-68-3	Hexachlorobutadiene	73000.	U	56-55-3	Benzo(a)anthracene	73000.	U
59-50-7	4-Chloro-3-methylphenol	73000.	U	117-81-7	bis(2-Ethylhexyl)phthalate	73000.	U
91-57-6	2-Methylnaphthalene	73000.	U	218-01-9	Chrysene	73000.	U
77-47-4	Hexachlorocyclopentadiene	73000.	U	117-84-0	Di-n-octylphthalate	73000.	U
88-06-2	2,4,6-Trichlorophenol	73000.	U	205-99-2	Benzo(b)fluoranthene	73000.	U
95-95-4	2,4,5-Trichlorophenol	360000.	U	207-08-9	Benzo(k)fluoranthene	73000.	U
91-58-7	2-Chloronaphthalene	73000.	U	50-32-8	Benzo(a)pyrene	73000.	U
88-74-4	2-Nitroaniline	360000.	U	193-39-5	Indeno(1,2,3-cd)pyrene	73000.	U
131-11-3	Dimethylphthalate	73000.	U	53-70-3	Dibenzo(a,h)anthracene	73000.	U
208-96-8	Acenaphthylene	73000.	U	191-24-2	Benzo(g,h,i)perylene	73000.	U
99-09-2	3-Nitroaniline	360000.	U				

(1)-Cannot be separated from diphenylamine

## **QUALITY CONTROLS**

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 10.0000  
Sample wt/vol: 30 g  
Date Extracted: 08/08/88  
Date Analyzed: 8/29/88 15:58

Lab Sample ID: EAS973-00MB  
Customer Sample: NA  
Sample Description: Method Blank  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized:

*[Signature]*

C.A.S. Number		ug/Kg		C.A.S. Number		ug/Kg	
108-95-2	Phenol	3300.	U	83-32-9	Acenaphthene	3300.	U
111-44-4	bis(2-Chloroethyl)ether	3300.	U	51-28-5	2,4-Dinitrophenol	17000.	U
95-57-8	2-Chlorophenol	3300.	U	100-02-7	4-Nitrophenol	17000.	U
541-73-1	1,3-Dichlorobenzene	3300.	U	132-64-9	Dibenzofuran	3300.	U
106-46-7	1,4-Dichlorobenzene	3300.	U	121-14-2	2,4-Dinitrotoluene	3300.	U
100-51-6	Benzyl alcohol	3300.	U	606-20-2	2,6-Dinitrotoluene	3300.	U
95-50-1	1,2-Dichlorobenzene	3300.	U	84-66-2	Diethylphthalate	3300.	U
95-48-7	2-Methylphenol	3300.	U	7005-72-3	4-Chlorophenyl-phenylether	3300.	U
39638-32-9	bis(2-chloroisopropyl)ether	3300.	U	86-73-7	Fluorene	3300.	U
106-44-5	4-Methylphenol	3300.	U	100-01-6	4-Nitroaniline	17000.	U
621-64-7	N-Nitroso-di-n-propylamine	3300.	U	534-52-1	4,6-Dinitro-2-methylphenol	17000.	U
67-72-1	Hexachloroethane	3300.	U	86-30-6	N-Nitrosodiphenylamine (1)	3300.	U
98-95-3	Nitrobenzene	3300.	U	101-55-3	4-Bromophenyl-phenylether	3300.	U
78-59-1	Isophorone	3300.	U	118-74-1	Hexachlorobenzene	3300.	U
88-75-5	2-Nitrophenol	3300.	U	87-86-5	Pentachlorophenol	17000.	U
105-67-9	2,4-Dimethylphenol	3300.	U	85-81-8	Phenanthrene	3300.	U
65-85-0	Benzoic acid	17000.	U	120-12-7	Anthracene	3300.	U
111-91-1	bis(2-Chloroethoxy)methane	3300.	U	84-74-2	Di-n-butylphthalate	3300.	U
120-83-2	2,4-Dichlorophenol	3300.	U	206-44-0	Fluoranthene	3300.	U
120-82-1	1,2,4-Trichlorobenzene	3300.	U	129-00-0	Pyrene	3300.	U
91-20-3	Naphthalene	3300.	U	85-68-7	Butylbenzylphthalate	3300.	U
106-47-8	4-Chloroaniline	3300.	U	91-94-1	3,3'-Dichlorobenzidine	6700.	U
87-68-3	Hexachlorobutadiene	3300.	U	56-55-3	Benzo(a)anthracene	3300.	U
59-50-7	4-Chloro-3-methylphenol	3300.	U	117-81-7	bis(2-Ethylhexyl)phthalate	3300.	U
91-57-6	2-Methylnaphthalene	3300.	U	218-01-9	Chrysene	3300.	U
77-47-4	Hexachlorocyclopentadiene	3300.	U	117-84-0	Di-n-octylphthalate	3300.	U
88-06-2	2,4,6-Trichlorophenol	3300.	U	205-99-2	Benzo(b)fluoranthene	3300.	U
95-95-4	2,4,5-Trichlorophenol	17000.	U	207-08-9	Benzo(k)fluoranthene	3300.	U
91-58-7	2-Chloronaphthalene	3300.	U	50-32-8	Benzo(a)pyrene	3300.	U
88-74-4	2-Nitroaniline	17000.	U	193-39-5	Indeno(1,2,3-cd)pyrene	3300.	U
131-11-3	Dimethylphthalate	3300.	U	53-70-3	Dibenzo(a,h)anthracene	3300.	U
208-96-8	Acenaphthylene	3300.	U	191-24-2	Benzo(g,h,i)perylene	3300.	U
99-09-2	3-Nitroaniline	17000.	U				

(1)-Cannot be separated from diphenylamine

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Ecova Corporation  
Project Number: 821401  
Sample Matrix: Water  
Concentration: Low Dilution Factor: 1.0000  
Sample wt/vol: 1000 ml  
Date Extracted: 08/05/88  
Date Analyzed: 8/30/88 12:39

Lab Sample ID: EAS973-00MB  
Customer Sample: NA  
Sample Description: Method Blank  
Date Collected: NA  
Time Collected: NA  
Date Received: 08/02/88  
Data Release Authorized

*[Signature]*

C.A.S. Number		ug/L		C.A.S. Number		ug/L
108-95-2	Phenol	10.	U	83-32-9	Acenaphthene	10. U
111-44-4	bis(2-Chloroethyl)ether	10.	U	51-28-5	2,4-Dinitrophenol	50. U
95-57-8	2-Chlorophenol	10.	U	108-02-7	4-Nitrophenol	50. U
541-73-1	1,3-Dichlorobenzene	10.	U	132-64-9	Dibenzofuran	10. U
106-46-7	1,4-Dichlorobenzene	10.	U	121-14-2	2,4-Dinitrotoluene	10. U
100-51-6	Benzyl alcohol	10.	U	606-20-2	2,6-Dinitrotoluene	10. U
95-50-1	1,2-Dichlorobenzene	10.	U	84-66-2	Diethylphthalate	10. U
95-48-7	2-Methylphenol	10.	U	7005-72-3	4-Chlorophenyl-phenylether	10. U
79638-32-9	bis(2-chloroisopropyl)ether	10.	U	86-73-7	Fluorene	10. U
106-44-5	4-Methylphenol	10.	U	100-01-6	4-Nitroaniline	50. U
621-64-7	N-Nitroso-di-n-propylamine	10.	U	534-52-1	4,6-Dinitro-2-methylphenol	50. U
67-72-1	Hexachloroethane	10.	U	86-30-6	N-Nitrosodiphenylamine (1)	10. U
98-95-3	Nitrobenzene	10.	U	101-55-3	4-Bromophenyl-phenylether	10. U
78-59-1	Isophorone	10.	U	118-74-1	Hexachlorobenzene	10. U
88-75-5	2-Nitrophenol	10.	U	87-86-5	Pentachlorophenol	50. U
105-67-9	2,4-Dimethylphenol	10.	U	85-01-8	Phenanthrene	10. U
65-85-0	Benzoic acid	50.	U	120-12-7	Anthracene	10. U
111-91-1	bis(2-Chloroethoxy)Methane	10.	U	84-74-2	Di-n-butylphthalate	10. U
120-83-2	2,4-Dichlorophenol	10.	U	206-44-0	Fluoranthene	10. U
120-82-1	1,2,4-Trichlorobenzene	10.	U	129-00-0	Pyrene	10. U
91-20-3	Naphthalene	10.	U	85-68-7	Butylbenzylphthalate	10. U
106-47-8	4-Chloroaniline	10.	U	91-94-1	3,3'-Dichlorobenzidine	20. U
87-68-3	Hexachlorobutadiene	10.	U	56-55-3	Benzo(a)anthracene	10. U
59-50-7	4-Chloro-3-methylphenol	10.	U	117-81-7	bis(2-Ethylhexyl)phthalate	5. J
91-57-6	2-Methylnaphthalene	10.	U	218-01-9	Chrysene	10. U
77-47-4	Hexachlorocyclopentadiene	10.	U	117-84-8	Di-n-octylphthalate	10. U
88-06-2	2,4,6-Trichlorophenol	10.	U	205-99-2	Benzo(b)fluoranthene	10. U
95-95-4	2,4,5-Trichlorophenol	50.	U	207-08-9	Benzo(k)fluoranthene	10. U
91-58-7	2-Chloronaphthalene	10.	U	50-32-8	Benzo(a)pyrene	10. U
88-74-4	2-Nitroaniline	50.	U	193-39-5	Indeno(1,2,3-cd)pyrene	10. U
131-11-3	Dimethylphthalate	10.	U	53-70-3	Dibenzo(a,h)anthracene	10. U
208-96-8	Acenaphthylene	10.	U	191-24-2	Benzo(g,h,i)perylene	10. U
99-09-2	3-Nitroaniline	50.	U			

(1)-Cannot be separated from diphenylamine

Form 1

7/85

D-14

BZTO104(e)011772



## **APPENDIX E. Treatment Study Report**

Project No: 821401

September 6, 1988

Client: TIME OIL

Project Title: TREATMENT STUDY OF PCP CONTAMINATED SOILS

To: Mark Anderson

From: Bill Mahaffey *BM*

cc: Al Bourquin  
John Kinsella

**OBJECTIVE:**

Time Oil Company has identified a site with extensive pentachlorophenol (PCP) contamination in the soil (up to 8000 ppm). The company has indicated that it has considered investigating soil washing treatment and is seeking cost effective alternative technologies. Ecova has acquired soil samples for evaluating potential treatment technologies which may be applied at the site for subsequently preparing a remediation proposal for the contaminated soils. Candidate technologies which were evaluated were variations of soil slurry biotreatment and soil washing.

**SOIL CHARACTERIZATION:**

The soil samples acquired from the Time Oil site were sandy in texture. Four individual samples were composited and analyzed. Soils were extracted following EPA standard methodology (Method #720). The PCP concentration in the composited soil was determined to be 680 mg/kg by gas chromatography and mass spectral analysis. Individual soil samples ranged in concentration from 2.2 ppm to 2000 ppm. pH of the composite soil was low.

**A. SLURRY TREATMENT:**

Composited soil was placed in duplicate flasks at concentrations (weight of soil per slurry weight, w/w) of: 5 %, 15 %, 25 % and 40 % in the appropriate volume of an inorganic nutrient solution. This solution (pH 7.2) contains sufficient levels of nitrogen and phosphorus to sustain microbial growth on the mineralizable carbon in the soil. Soil slurries were placed on a shaker and incubated for one week at constant temperature. After one week, the PCP concentration and pH of the 15 - 40 % slurries were determined. The pH of these slurries had decreased to pH < 6 which may not be conducive to optimal microbial activity. To determine if pH impacted the biodegradation of PCP the pH of the 5 %, 15 % and 40 % soil slurries were readjusted to pH = 7.2. It was determined that 0.01 equivalents of base per kg of soil was required to obtain a pH of 7.2 in the 40 % slurries. The amount of base added to the 15 % and 5% slurries was adjusted accordingly and a pH of 7.2 confirmed by direct measurement. The

25 % slurries were left unchanged and served as a control. Slurry flasks were incubated on the shaker an additional week and PCP concentrations again determined. No PCP degrading organisms were found in the original soil samples. Therefore an inoculum of proprietary Ecova PCP degrading organisms was added. After four and ten days of incubation following the inoculum addition, PCP levels were once again determined.

#### PCP ANALYSIS:

To obtain rapid and accurate evaluation of PCP degradation in the slurry evaluations, a UV/Vis spectrophotometric analysis was employed. Aliquots of the aqueous portion of the slurry scanned from 220 nm to 400 nm. PCP concentrations were calculated on the basis of the absorption at 320 nm after subtracting the baseline correction absorption at 360 nm. A standard curve for absorption vs PCP concentration was linear to 1.0 ppm (mg/l). Method interferences are additive for spectrophotometric methods and therefore ND (non detected) means concentrations can be no higher than the detection limit.

#### RESULTS:

Results of the slurry experiments are summarized in the table below and in the attached figure. As can be seen from the data on the 40 % slurry the UV/Vis method of PCP analysis (248 mg/l) is in very good agreement with the theoretical values calculated from the GCMS analysis of the composited soil (272 mg/l).

SAMPLE	PCP Concentration mg/l (% reduction)				
	THEORETICAL	7 DAYS	13 DAYS**	17 DAYS	23 DAYS
40 % w/w	272(248)*	276	250(10%)	190(24%)	ND(100%)
25 % w/w @	170	145	130(10%)	--	33(75%)
15 % w/w	102	100	76(24%)	10(86%)	ND(100%)
5 % w/w	34	---	ND	--	ND

\* Time 0 PCP concentration of 40 % slurry measured by UV/VIS spectroscopy all other values extrapolated from PCP value of 680 ppm in composited soil

\*\* Inoculum added to slurries on Day 13.

@ 25 % slurries pH < 6. Other slurries adjusted to pH = 7.2.

ND - non detected. Detection limit = 1.0 ppm.

Although some reduction may have occurred during the first two weeks, there was little evidence for the existance of any significant biological activity for PCP degradation in the Time Oil soils. Attempts to isolate PCP degrading microbes from the slurries were unsuccessful. A PCP degrading culture from the Ecova culture collection adapted to growth on 1000 mg/l PCP was

four day period: 86.8% and 24.0% reduction in the 15 % and 40 % w/w slurries respectively. This reduction was complete (100%) after 10 days inoculation in both the 15 % and 40 % slurries. The rates of PCP removal before and after inoculation are the following:

Slurry Concentration	Before Inoculation		After Inoculation	
	Rate Constant	Tl/2 (Days)	Rate Constant	Tl/2 (Days)
40 %	k=0.016	42	k=0.5	1.4
25 % *	k=0.018	38	k=0.137	5.0
15 %	k=0.046	15	k=0.5	1.4

\* 25 % slurry pH < 6.0. Other slurries adjusted to 7.2.

#### Conclusions:

1. The level of natural microbiological PCP degrading activity was low in Time Oil slurries. Based on the rate of PCP removal with the natural microbial population the treatment time would be quite long. There is no indication that target levels of PCP could be achieved using these organisms.
2. The introduction of an inoculum from Ecova's culture collection was effective in enhancing the biological removal of PCP from the soil slurries in four days and was able to reduce the 40 %, 15% and 5 % slurries to non-detectable levels in 10 days post inoculation.
3. Rate of biodegradation is significantly affected by pH. Natural soil pH is quite low and therefore will require adjustment to neutral conditions to accomodate optimum microbial activity.
4. Rate of biodegradation is not affected significantly by slurry concentrations. Engineering constraints on maintaining slurry suspensions are more significant.
5. From a biological perspective slurry treatment is effectively given the proper population of microorganisms is introduced and maintained.
6. The use of a UV/Vis spectrophotometric analysis of PCP is a valid, cost effective method which allows rapid sample turnaround for process monitoring.

#### B. SOIL WASHING TREATMENT:

After receiving the Time Oil soils it was noted that their sandy texture and low clay content might favor soil washing followed by biological treatment of the leachate. To evaluate

this alternative a separate composited soil sample was prepared and washed with various volumes of a basic solution. The PCP concentration in this composite was found to be 1180 mg/kg soil. A wash consisted of shaking a mass of soil with a volume of base solution in a ratio of 1:2 (w/v) for 3 minutes. Soil was allowed to gravity settle and the supernatant solution decanted. After several washings, the soil was extracted using standard EPA protocols (Method 720) for PCP extraction. Wash solutions and final soil extracts were evaluated by UV/Vis spectrophotometry which provided a rapid sensitive method for PCP analysis.

Findings: Results are summarized in the table below:

RESIDUAL SOIL PCP CONCENTRATION	
<u>SAMPLE</u>	<u>UV/VIS METHOD*</u>
2 x WASH	210 mg/l
4 x WASH	26 mg/l

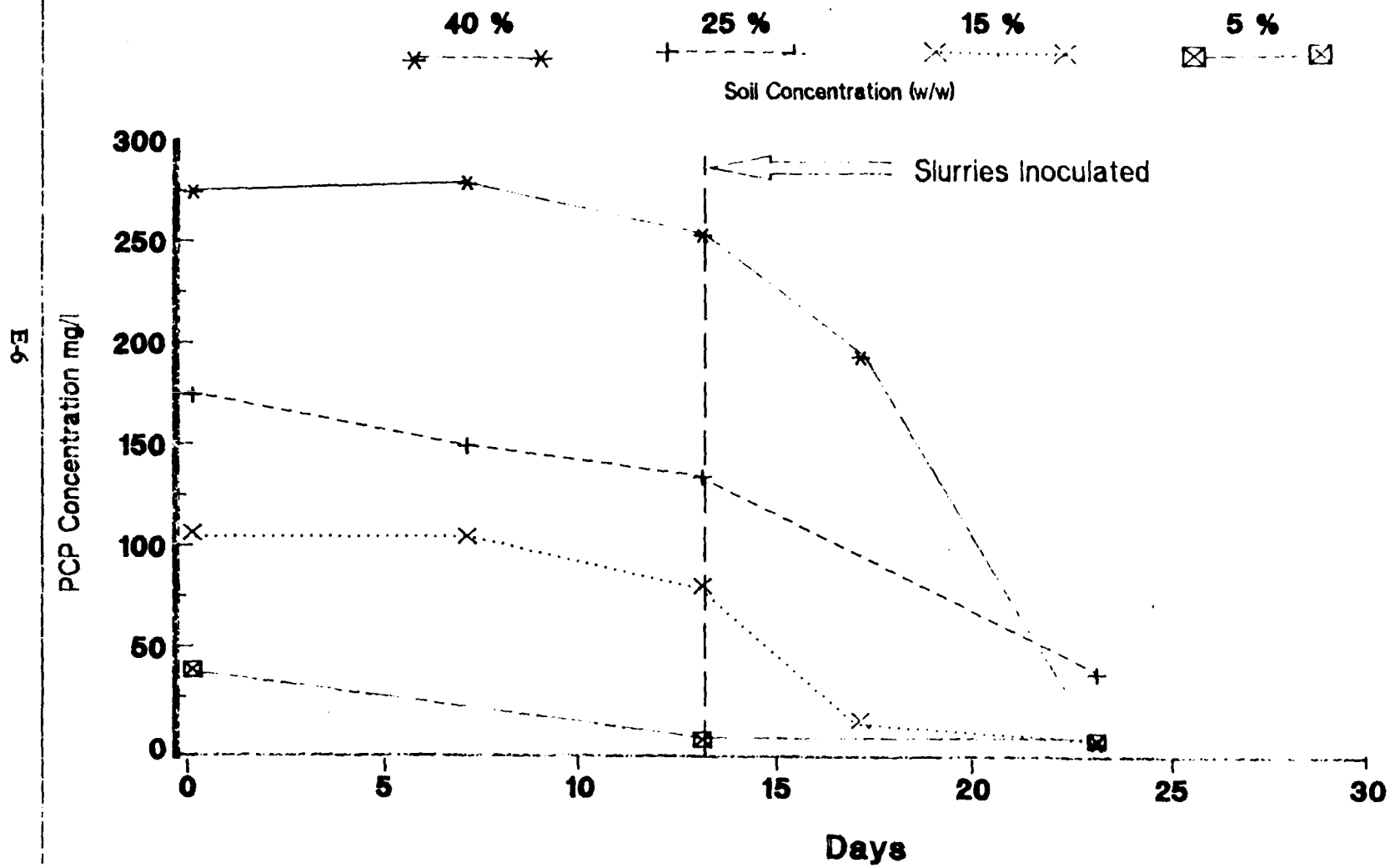
\* Method involves screening basic aqueous extract of the soil at 320 nm.

It is evident that soil washing would be quite effective at removing most of the residual PCP from the soil. This could be advantageous from a treatment perspective as it is easier to treat a liquid than a soil slurry. Materials handling is easier in that the treatment system can be run with a continuous feed, which may be difficult with a soil treatment system. Also retention times can be reduced considerably. For example Ecova is currently operating a laboratory bioreactor with a microbial population which is capable of growing on 1000 mg/l/day PCP and will tolerate concentrations up to 3000 mg/l/day. If the washing effectively reduces the PCP concentration in the soil to delisting concentrations then this alternative should be evaluated seriously.

#### CONCLUSIONS:

1. Soil washing can effectively reduce PCP concentrations to low levels.
2. In previous studies, Ecova has demonstrated that wash leachates can be rapidly treated in a continuous feed reactor, with minimal neutralization required.
3. In addition to tankage requirements large quantities of alkali are required for soil washing.

# PCP Reduction Time Oil Soil Slurries



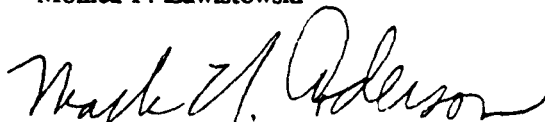
IME OIL CO.  
ECOVA HEALTH & SAFETY PLAN  
(DEC. 1988)

**TIME OIL**  
**SITE SPECIFIC**  
**HEALTH AND SAFETY PLAN**

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## TABLE OF CONTENTS

	<u>Page</u>
1.0 HEALTH AND SAFETY PLAN .....	1-1
1.1 Purpose and Objectives .....	1-1
2.0 SITE BACKGROUND .....	2-1
2.1 Site History .....	2-1
2.2 Site Description .....	2-1
2.3 Site Location .....	2-1
3.0 RESPONSIBILITIES .....	3-1
3.1 Site Safety Officer (SSO) .....	3-1
3.2 Project Manager .....	3-3
3.3 Medical Assistance .....	3-3
4.0 EMERGENCY TELEPHONE NUMBERS .....	4-1
5.0 HAZARD ASSESSMENT .....	5-1
5.1 Chemical Exposure .....	5-1
5.2 Fire and Explosion .....	5-1
5.3 Oxygen Deficiency .....	5-1
5.4 Biologic Hazards .....	5-1
5.5 Safety Hazards .....	5-2
5.6 Heat/Cold Stress .....	5-2
5.7 Noise .....	5-2
5.8 Electric Hazards .....	5-2
6.0 HEALTH AND SAFETY TRAINING .....	6-1
6.1 Training Requirements .....	6-1
6.2 Daily Safety Meetings .....	6-1
7.0 PERSONAL PROTECTIVE EQUIPMENT .....	7-1
7.1 Level D Operations .....	7-1
7.2 Level C Operations .....	7-1
7.3 Level B Operations .....	7-1
8.0 MEDICAL SURVEILLANCE .....	8-1
9.0 SITE CONTROL .....	9-1
9.1 Site Security .....	9-1
9.2 Site Work Zones .....	9-1
9.3 Decontamination Procedures .....	9-1
9.4 Recordkeeping .....	9-2
9.5 Emergency Response Plan .....	9-2
9.6 Emergency Follow-up and Evaluation .....	9-3
9.7 Procedures for Reporting to State, Local and Federal Agencies .....	9-3
9.8 Emergency Evacuation Procedures .....	9-3
9.9 General Safe Work Practices .....	9-3
10.0 ENVIRONMENTAL MONITORING PLAN .....	10-1
10.1 Hazardous Substances Migration Pathways .....	10-1
10.2 Air Monitoring and Sampling .....	10-1
10.3 Heat/Cold Stress Monitoring .....	10-3

## FIGURES

	<u>Page</u>
FIGURE 3-1. Site Location and Hospital Route .....	3-2
FIGURE 4-1. Hospital Route .....	4-2

## TABLES

TABLE 5-1. Characteristics of Pentachlorophenol .....	5-1
TABLE 10-2. Initial Site Action Levels .....	10-2
TABLE 10-3. Work-Rest Regimens and Heat Exposure Threshold Limit Values .....	10-4

## ATTACHMENTS

ATTACHMENT 1 - Field Team Review .....	A-1
ATTACHMENT 2 - Pentachlorophenol MSDS .....	A-2
ATTACHMENT 3 - Tailgate Safety Meeting .....	A-3
ATTACHMENT 4 - Sampling Method .....	A-4
ATTACHMENT 5 - Hager Laboratories Data Sheet .....	A-5

## **1.0 HEALTH AND SAFETY PLAN**

Ecova has established this Health and Safety Plan (HASP) for all employees engaged in field activities at the Time Oil property in Portland, Oregon. Prior to any work onsite, a copy of this HASP shall be provided to all employees and subcontractors by the project manager. All site work shall be conducted in a safe manner and comply with EPA, OSHA (in particular, 29 CFR part 1910.120), state, and local regulations.

### **1.1 PURPOSE AND OBJECTIVES**

The purpose of this site-specific HASP is to provide guidelines and procedures to ensure the health and physical safety of those persons working at the Time Oil site. While it may be impossible to eliminate all risks associated with site work, the goal is to provide state-of-the-art precautionary and responsive measures for the protection of onsite personnel, the general public, and the environment.

The HASP objectives are as follows:

- o Safety of all site personnel
- o Protection of the public and the environment
- o Adherence to Ecova health and safety policies and procedures

This HASP will be reviewed and the Field Team Review (attachment 1) signed by all site personnel. The HASP will be implemented in the field by the designated Ecova Site Safety Officer.

## **2.0 SITE BACKGROUND**

### **2.1 SITE HISTORY**

Time Oil operates a petroleum products terminal in Portland, Oregon, that provides tank storage facilities for its products as well as custom storage for outside customers. Until recently, Time Oil also operated a PCP mixing facility at the Northwest Terminal to produce products for a wood treating chemicals manufacturing and distributing firm. Operations included melting blocks of virgin PCP, mixing with mineral spirits, and repackaging the mixture for shipment. Operations were discontinued at the plant several years ago.

During the time of plant operation, soils beneath and nearby the processing units became contaminated with the PCP product, especially around the drum or tank loading area near the wood treating chemicals warehouse. Since the decommissioning of the plant, all of the PCP processing units have been removed.

Time Oil has conducted a number of investigations to determine the extent of PCP contamination in the soils surrounding the facility and in downgradient groundwater. As a result of their confirmation of the presence of PCP in these media, Time Oil retained Ecova Corporation to bioremediate the site. At present, there is no active enforcement action being taken relative to the site by any regulatory agency.

### **2.2 SITE DESCRIPTION**

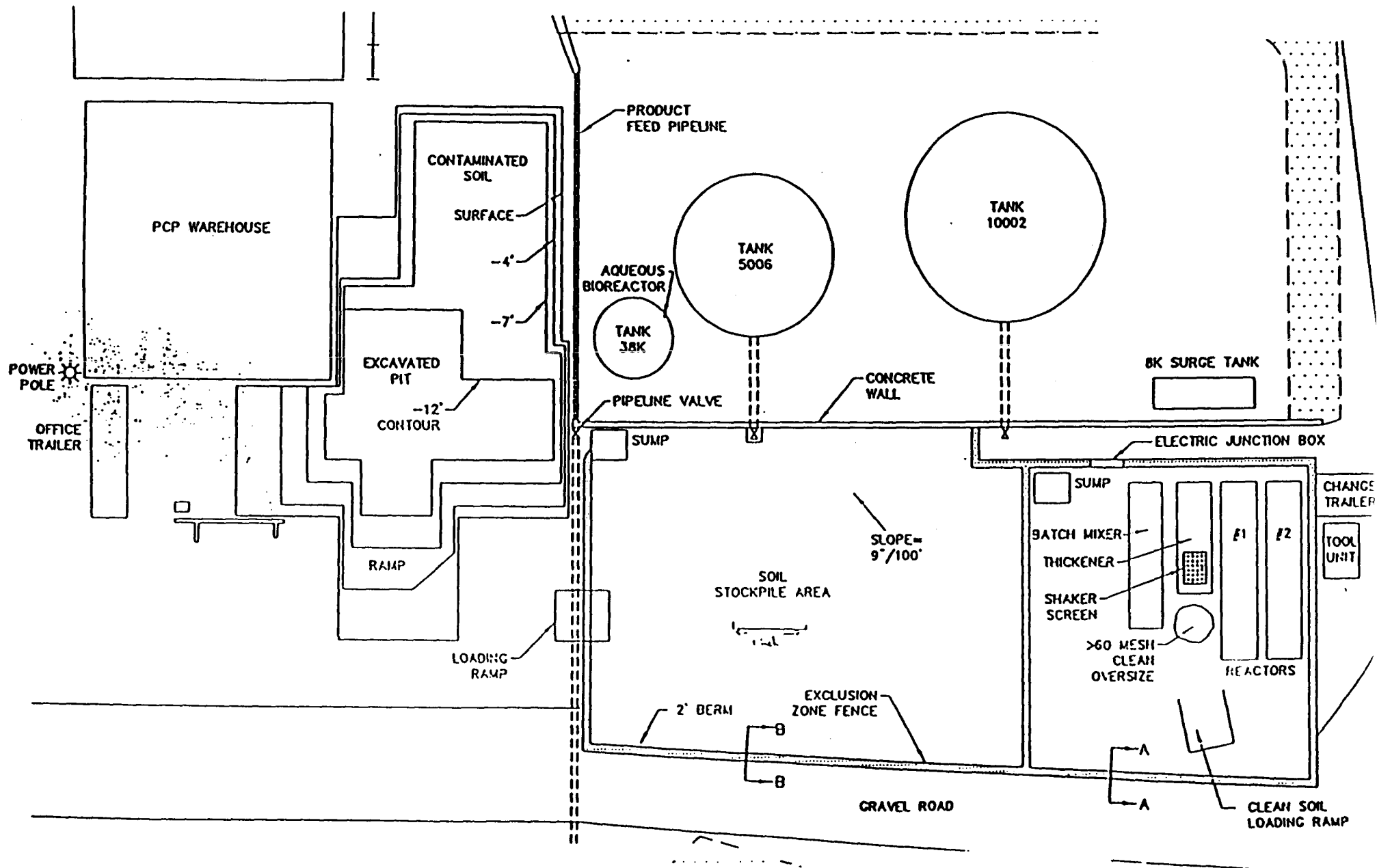
The layout of the site is illustrated in Figure 2-1, Site Layout. Time Oil has identified approximately 3,440 cubic yards of soil with PCP contamination exceeding 500 ppm. From information provided by Time Oil, concentrations of PCP have ranged to 8,400 ppm in the soil around the loadout area near the southern corner of the plant warehouse. Concentrations declined rapidly a few feet away from the "hot spot," generally decreasing to concentrations of under 1,500 ppm which is approximately the average concentration reported by Time Oil.

Soil type is generally mixed sands, silts, and gravels normally associated with a former river channel environment. Little clay appears to be present near the surface, although lenses may occur at depth. With little clay present, the PCP tends to be mobile, migrating downward into the soil vadose zone and entering the groundwater underlying the site, 13 to 20 feet below ground level.

### **2.3 SITE LOCATION**

The Time Oil property is located at 12005 North Burgard Road, Portland, Oregon. The site is bordered to the south by the Willamette River.

FIGURE 2.1 Site Layout - Time Oil Company



### **3.0 RESPONSIBILITIES**

#### **3.1 SITE SAFETY OFFICER (SSO)**

The SSO, Monica Zawistowski (or designee) will ensure that the HASP is adequate for employee and public protection at the Time Oil site. The SSO has review and approval authority over any changes/modifications to the HASP. The SSO or designee shall be present onsite during all activities where exposure to site contaminants may occur. In addition, the SSO or designee has the authority to stop work if an imminent danger to life or health is detected and to resolve that threat before allowing work to resume.

The SSO or designee is responsible for directing and implementing the HASP and ensuring that all Ecova and subcontractor personnel have been trained in HASP procedures. The SSO or designee will coordinate safety activities with subcontractors and will serve as liaison with public officials who might monitor health and safety activities onsite. The SSO will also ensure that proper protective equipment is available and used in the correct manner, that decontamination activities are carried out correctly, that specific site hazards are noted and accounted for in the Work Plan, and that employees have knowledge of the local emergency medical system.

#### **3.2 PROJECT MANAGER**

The Ecova Project Manager, Mark Anderson, is the direct link between Ecova and Time Oil. He is responsible for directing all onsite hazardous waste operations, including the overall implementation of the Health and Safety program. He will select subcontractors that meet Ecova Corporation Health and Safety training and experience guidelines. In addition, the Project Manager is responsible for ensuring that adequate resources and personal protective equipment are allocated for the health and safety of site personnel. The Project Manager is also responsible for ensuring that the SSO is given free access to all relevant site information that could impact health and safety. He will correct conditions or work practices that could lead to employee exposure to hazardous materials. Charles Thames will direct all field activities in Mark Anderson's absence and will have full responsibility for making all onsite decision.

#### **3.3 MEDICAL ASSISTANCE**

Patricia Sparks, M.D., Ecova's Occupational Medical Consultant, will be available to answer medical questions and provide guidance in unexpected situations. The Medical Consultant will recommend appropriate medical monitoring for the site team members.

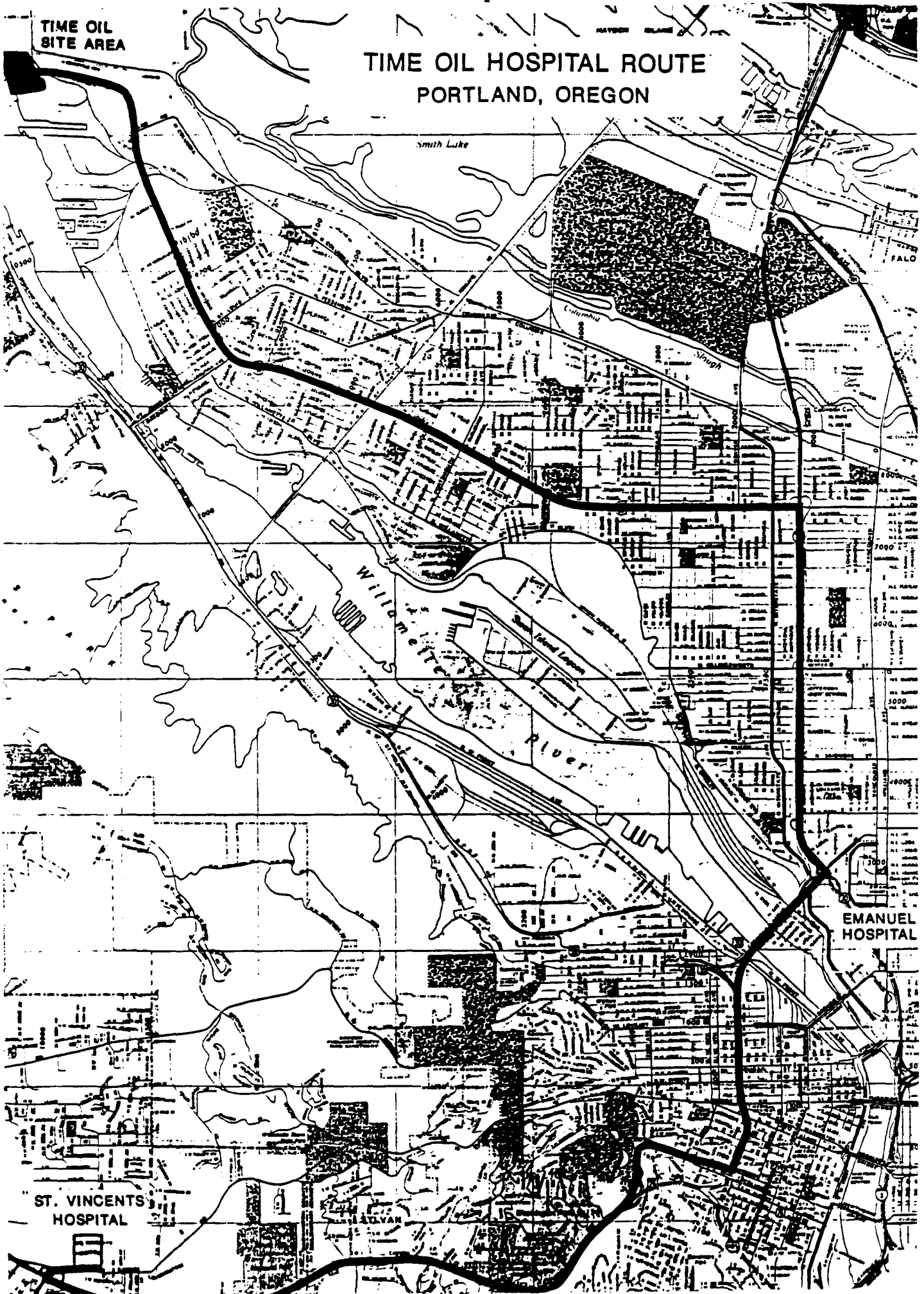
#### 4.0 EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers shall be posted onsite and made immediately available at all times. These numbers shall include the following:

##### Emergency

Fire .....	911
Ambulance .....	911
Paramedics .....	911
Police .....	911
Emergency Rooms (see Figure 4-1 for Hospital Routes)	
Occupational Physician:	
Dr. P. Sparks; Providence Medical Center .....	(206) 329-0200
Dr. K. Griffith, St. Vincents (Alternate) .....	(503) 297-4411
Ecova .....	(206) 883-1900
Time Oil .....	(503) 286-1611 or (206) 285-2400

FIGURE 4-1. Hospital Route





## 5.0 HAZARD ASSESSMENT

This hazard assessment is based on available information concerning chemical and physical hazards known or suspected to be present at the Time Oil site. The potential risks to site workers are evaluated below.

TABLE 5-1. Characteristics of Pentachlorophenol

Chemical Name	PEL (mg/m <sup>3</sup> )	IDHL (mg/m <sup>3</sup> )	LEL/UEL/fl.pt	MP/BP	Incompatibilities	Routes of Exposure	Target Organs
Penta chlorophenol	0.5	150	Not Combustible	360°F 591°F	Strong oxidizers	Inh Ing Abs Con	Skin, mucous membrane, respiratory system, CNS, liver cardiovascular system, kidneys, eyes, possible CA
Sodium hydroxide	2.0	250	Not Combustible	590°F 2534°F	Water, acids, flammable liquids, organic halogens metals	Inh Ing Con	Eyes, respiratory system, skin

### Definitions

LEL = Lower Explosive Limit Inh = Inhalation

UEL = Upper Explosive Limit Ing = Ingestion

FL.PT = Flash Point

Ca = Carcinogen

MP = melting point

BP = boiling point

Abs = Absorption

Con = Skin and Eye Contact

## 5.1 CHEMICAL EXPOSURE

Site workers may be exposed to hazardous chemicals during field activities. Expected exposure is to contaminated soil. At present, the only potential hazardous compound is Pentachlorophenol (PCP). PCP is a light brown solid material with a pungent odor when hot. Sodium hydroxide will be used onsite during the treatment operation to adjust the pH of the slurry. A condensed description of these chemicals can be found in Table 5-1. In addition, the MSDS for Pentachlorophenol (PCP) and sodium hydroxide are included in this HASP as Attachment 2. Skin absorption is the more significant route of exposure of PCP and sodium hydroxide. Measures shall be taken to eliminate personnel exposure through the use of personal protection equipment when engineering controls are not feasible.

## 5.2 FIRE AND EXPLOSION

The risk of fire or explosion during site activities are minimal PCP is not combustible. When PCP is heated, highly toxic fumes of Cl are emitted. Sodium hydroxide is very reactive with water and results in the evolution of large quantities of heat. Sodium hydroxide will be added to the slurry in a controlled manner to lessen the chance of fire or explosion. For added security, smoking is not allowed on the site at any time. Fuel refilling will occur away from all flammable materials. In addition, grounding and bonding wires will be utilized when transferring flammable liquids to prevent sparks. If flammable liquids/materials are stored onsite, proper storage techniques will be utilized. Strong oxidizers will also be kept away from the site as much as possible. (Good housekeeping practices will be employed to prevent the chance of fire and/or explosions.)

### **5.3 OXYGEN DEFICIENCY**

It is not expected that an oxygen-depleted atmosphere will be encountered during site activities. Whenever the risk of encountering an oxygen-depleted atmosphere does exist (confined space entry, for example), precautions will be taken to ensure the safety of all employees. Confined space entries are used only as a last resort, when all other means have been exhausted. Ecova Corporation uses a special permit system for confined space entry, entailing substantial additional employee training and atmospheric monitoring.

### **5.4 BIOLOGIC HAZARDS**

It is not anticipated that poisonous plants or hazardous animals will be encountered during site activities.

### **5.5 SAFETY HAZARDS**

The principal safety hazards will be those associated with the drilling of monitoring wells, the movement of soil and heavy equipment and the operation of remediation equipment. These will be minimized by carefully laying out the site and controlling vehicle movement to avoid collisions. Back-up alarms will be in working order to warn pedestrian workers of moving equipment. All equipment shall have appropriate guards in place.

Additional hazards include slipping on muddy or unstable ground, back strain from lifting heavy objects, and maintenance work on the equipment. These hazards will be controlled by the use of sturdy work boots, training, concerning property lifting techniques and lockout/zero mechanical state procedures, respectively. In the event overhead power lines are adjacent to operations involving heavy equipment that may come into contact with the lines, these power lines will be guarded/insulated or turned off. Prior to drilling or excavation activities, a locate service will be consulted to assure that no utilities are in the path of proposed boring or excavating locations.

During excavation activities, soil will be stockpiled at least two feet from the side of the excavation. When excavating adjacent to buildings, \_\_\_\_\_ will be used to prevent the building from collapsing. Personnel will not enter the excavation while digging is actively taking place. Prior to entry, the sides of the excavation will be properly shored and braced and a means for easy egress will be provided.

### **5.6 HEAT/COLD STRESS**

Wearing personal protective equipment while conducting site operations puts the individual worker at considerable risk of developing heat-related disorders, collectively called heat stress. Monitoring will be performed by the SSO or designee to avoid a heat stress condition, using both oral temperatures and radial pulse rate for all workers engaging in heavy labor at ambient temperatures over 70°F. Where work is anticipated in cold weather, a similar evaluation of worker health risks will be made. Appropriate warm clothing and heated rest areas will be available if outside temperatures fall below 40°F for more than two hours. (See Section 8.3 Heat/Cold Stress Monitoring for additional information.)

### **5.7 NOISE**

Excess exposure to noise is expected to be minimal during site activities. If noise levels are suspected at levels above 85 decibels (dBa), monitoring will be conducted. In general, excess noise is "suspected" when persons standing next to each other are not audible to each other. Appropriate hearing protection will be used if the noise levels exceed 85 dBa. In addition, ear plugs will be available onsite at all times for worker comfort if desired. A Hearing Conservation Program has been established at Ecova Corporation and is in effect for all site locations.

### **5.8 ELECTRIC HAZARDS**

Various uses of electrical power could exist. As information is acquired, it will be implemented in this HASP. In general, all electrical work, installation and wire capacities shall be in accordance with the provisions of the National Electric code. Power cords will be UL-listed heavy duty and include a grounding prong. Ground fault

circuit interrupters will be installed by a qualified electrician. If additional lines are installed, they will be covered or elevated to prevent damage which would create a hazard. All power cords and receptacles shall be inspected before use to ensure that the casings are not cracked, grounding prongs are attached and that there are no other visible defects. If any defects are found, the cord, receptacle, or equipment shall be tagged and placed out of use until fixed or disposed of. During heavy equipment maintenance activities, proper lockout procedures will be utilized. The site shall be arranged and equipment chosen to minimize the potential for contact of overhead power lines.

## **6.0 HEALTH AND SAFETY TRAINING**

This section describes the health and safety training requirements necessary for participating in field operations at the Time Oil site.

### **6.1 TRAINING REQUIREMENTS**

Ecova employees and subcontractors who enter the site will be able to recognize and understand the potential hazards to health and safety associated with the site operations. All employees potentially exposed to hazardous substances will have participated in 40 hours of initial health and safety instruction and three days of actual field experience under the direct supervision of a trained, experienced supervisor. The objectives of Ecova's health and safety training are:

- o To make each team member aware of the potential hazards they may encounter
- o To provide the knowledge and skills necessary to perform the work with minimal risk to worker health and safety
- o To make workers aware of the purpose and limitations of safety equipment
- o To ensure that workers can safely avoid or escape from emergencies

Workers exposed to special hazards (i.e., confined spaces) during field operations at the Time Oil site shall receive additional training as determined by the Site Safety Officer. Onsite managers and supervisors shall receive all training required for employees whom they supervise, plus eight additional hours of specialized training on management and supervision of such operations. Prior work experience or training will be acceptable provided that it is equivalent to the training requirements specified above.

Health and Safety Trainers themselves have been trained at a level higher than and including the subject matter to be taught, either through actual course work or field experience. Employees shall not engage in field activities until they are successfully trained and certified by the instructor as having completed the required training. Training records for each individual will be maintained by Ecova Corporation.

### **6.2 DAILY SAFETY MEETINGS**

Site-specific "tailgate" safety briefings (Attachment 3) will be conducted daily by the SSO or designee to discuss the day's operations and to ensure that site personnel have the necessary information to conduct their jobs safely.

## **7.0 PERSONAL PROTECTIVE EQUIPMENT**

This section details the level of personal protection to be used during field operations at the Time Oil site. Appropriate levels of protection have been determined using information detailed in the site hazard assessment. For the most part, the treatment system is a closed system, thus reducing the chance of worker exposure. The most common route of exposure for PCP is skin contact, thus warranting dermal protection. During all field operations, personnel shall wear hardhats, safety glasses, and rubber, steel toe safety boots.

### **7.1 LEVEL D OPERATIONS**

Site personnel will wear at a minimum Level D equipment. Level D protection consists of the general equipment, work overalls, rubberized work gloves, and have available an air purifying respirator (full face) with combination organic vapor high efficiency particulate cartridges. Dust masks may be utilized if their tends to be a "nuisance dust" problem on the site. In addition, dust monitoring devices may be worn during site activities to document personnel exposure. If washable work overalls are worn, they will be laundered after each use and changed at the end of the day or upon significant contamination, whichever occurs first. If work coveralls are worn they will be stored in 55 gallon drums for future disposal (incineration, hazardous waste landfill or industrial landfill).

### **7.2 LEVEL C OPERATIONS**

This may include sampling, equipment maintenance and equipment decontamination operations. Level C protective clothing will consist of general equipment plus full-face air purifying respirators with combination organic vapor high efficiency particulate cartridges (or a half face respirator and splash-proof goggles), work clothes, surgical inner gloves, Nitrile outer gloves, rubber work boots or nuke booties, and saranex-coated tyvek coveralls or tyvek coveralls (dependent on the nature of the soil; wet vs. dry). Full face respirators or the use of goggles with half face respirators have been designated due to the potential for eye damage upon exposure to PCP. The SSO or designee will fit-test all site personnel.

### **7.3 LEVEL B OPERATIONS**

Level B protection is not anticipated for the Time Oil site since the expected levels of PCP contamination is well below the OSHA PEL. Level B consists of all PPE described in Level C Operations with the substitution of a pressure demand SCBA with full face piece for the full-faced, air purifying respirator.

Levels C and D protection will be utilized during initial monitoring well installation and mobilization activities. After gaining additional site experience and data from air/soil sampling, these levels of protection will be re-evaluated to provide sufficient employee protection while maximizing productivity. A situation may be present in which Level C respiratory protection is utilized while Level D clothing is used. Criteria for downgrading personnel protective equipment during field activities will be laboratory results indicating no potential for exposure above the Permissible Exposure Limit (PEL) for any site contaminant. This is further explained in Section 10.2.

## **8.0 MEDICAL SURVEILLANCE**

A medical surveillance program has been instituted by Ecova Corporation for all employees with potential exposure to hazardous substances. An initial medical examination is given upon initiation of employment, annually thereafter, and upon termination. In addition, site specific monitoring will be established to document exposure for project personnel. The individual (3 maximum) with the greatest chance of long term exposure will be monitored, at the beginning of the project and every three months until project completion, for PCP exposure. Blood samples will be drawn at Dr. Griffith's office in Portland, Oregon, and analyzed by Pacific Toxicology in San Diego, California.

Each team member will have undergone a physical examination prior to site entry in order to verify that he/ she is physically able to use protective equipment (including respirators), work in hot or cold environments, and have no predispositions to occupationally-induced disease. The medical program will also consist of periodic follow-up exams and additional exams as needed to evaluate specific exposures or unexplainable illnesses. The exams will be provided by Dr. Patricia Sparks, who is Board-certified in Occupational Medicine, or an equally qualified alternate.

In addition, local health care providers have been identified in Section 4, Emergency Telephone Numbers, to provide emergency evaluations or care should an overexposure situation or accident occur while at the job site.

## 9.0 SITE CONTROL

### 9.1 SITE SECURITY

No one will be allowed to enter the site Exclusion Zones (see below) unless they have been given permission to do so by the Project Manager and SSO, and otherwise follow applicable portions of this HASP.

### 9.2 SITE WORK ZONES

Three or more work zones will be established at the Time Oil site. These work zones will be determined by the SSO onsite in order to account for wind speed/direction, physical characteristics of the site (i.e. fencing, buildings, etc.), and daily field operations. Each work zone will be clearly delineated and posted. The three work zones will be as follows:

Exclusion Zone. The area(s) which contains, or is suspected of containing hazardous materials, in this case, the initial excavation and treatment areas. The exclusion zone shall be clearly delineated by a "hotline" and posted. Only persons authorized by this HASP may enter the Exclusion Zone.

Contamination Reduction Zone (CRZ). This zone will be established to act as a transition zone for decontamination of equipment and personnel just outside the area of suspected contamination.

Support Zone. The area which is not contaminated. This area will be used to stage clean equipment and other support facilities.

### 9.3 DECONTAMINATION PROCEDURES

In order to assure that contamination is controlled and not spread from the site, decontamination procedures will be employed for both equipment and personnel.

All decontamination activity will be monitored to assure compliance with the procedures described below.

#### 9.3.1 PERSONNEL

All personnel known to be or suspected of being contaminated with hazardous materials will decontaminate fully before re-entry into the Support Zone. Decontamination will consist of the following steps:

- a. Drop equipment on plastic sheet at decontamination area (border of contaminated zone).
- b. Wash and rinse outer suits, booties and gloves with TSP solution and brush.
- c. Remove outer gloves and nuke booties and deposit in marked container.
- d. Remove protective suit and discard into marked container.
- e. Remove respirator if worn, remove cartridges and discard, deposit respirator into container for decontamination.
- f. Remove inner gloves and discard into container.
- g. Wash hands and face.
- h. Shower.

Used protective clothing will be packaged in 55-gallon drums for eventual offsite disposal.

Partial decontamination may be necessary or desirable in situations such as: heavy contamination prior to site egress, between sampling locations/collections, changing respirator cartridges, consultation with personnel outside the exclusion zone, or rest breaks to prevent heat stress or physical exhaustion. In such circumstances, field personnel may initiate the following partial decontamination procedures in the CRZ:

- o Drop equipment on plastic sheeting at hot line.
- o Wash and rinse outer gloves, booties, and/or suits depending on the reason for leaving the exclusion zone.
- o Removal of necessary equipment. Note that outer gloves should be removed prior to removing a respirator or protective suit.
- o Perform necessary reason for leaving exclusion zone.
- o Redress prior to entering exclusion zone or continue decontamination if leaving the CRZ.

At no time shall personnel enter the support zone without fully decontaminating.

#### 9.3.2 EQUIPMENT

All equipment must be decontaminated before leaving the Contamination Reduction Zone. Heavy equipment is difficult to decontaminate. The methods generally used are to wash them with high pressure water or steam clean and/ or to scrub accessible parts with a detergent/ water solution under pressure. Particular care must be given to tires, scoops, and other components in possible direct contact with contaminants.

Sampling instruments and other non-disposable equipment should be kept clean in disposable protective covers. Dippers, scoops, and similar devices for solid samples may be placed in plastic bags or metal drums for disposal or later decontamination.

Respirators will be cleaned and maintained after each use.

#### 9.3.3 EMERGENCY DECONTAMINATION

In the event that a seriously injured person is contaminated, the SSO or other site worker will wrap the injured individual in clean plastic sheeting to prevent contamination of the ambulance. Less severely injured individuals will have their protective clothing carefully cut off before transport to the hospital.

#### 9.3.4 DISPOSAL OF WASTE

All unused samples will be returned to the site. Disposable contaminated supplies will be securely drummed onsite, for disposal according to applicable regulations.

#### 9.4 RECORDKEEPING

To assure HASP implementation, many site activities will be documented. These include maintenance of HASP at the site; employee Field Team Review daily safety briefings; site sign-in log; respirator fit test worksheets; health and safety log notes (which include instrument calibration records, sampling data, monitoring results, and incident reports) chemical safety data sheets; and other records identified in the HASP.



## **9.5 EMERGENCY RESPONSE PLAN**

The HASP provides sufficient information to allow site personnel to respond effectively to any emergencies that might develop. A detailed description of each of the following functions has been included:

- o Pre-emergency planning has been performed during the writing of this HASP
- o Personnel roles and authority
- o Training and communication
- o Emergency recognition and prevention
- o A list of emergency telephone numbers
- o Evacuation routes, places of refuge, and directions to the nearest hospital(s)
- o Site security
- o Emergency decontamination
- o Emergency medical attention

## **9.6 EMERGENCY FOLLOW-UP AND EVALUATION**

The SSO will notify the Ecova Project Manager as soon as possible after an emergency situation has been stabilized. The Project Manager will then notify the Vice President of Operations, appropriate agencies, and client contacts. If an individual is injured, the Project Manager will file an Accident Report with the SSO.

## **9.7 PROCEDURES FOR REPORTING TO STATE, LOCAL AND FEDERAL AGENCIES**

In all cases, the Ecova Project Manager will be notified. He, in turn, will contact the client and any regulatory agencies.

## **9.8 EMERGENCY EVACUATION PROCEDURES**

In the event of a site emergency, all workers at the site will be notified by the SSO or designee to stop work immediately and offer assistance. Those not needed for immediate assistance will decontaminate per normal procedures and leave the site.

## **9.9 GENERAL SAFE WORK PRACTICES**

### **9.9.1 BUDDY SYSTEM**

A minimum of two people in constant communications (either visual or voice) with each other are required to perform work in the exclusion zone.

### **9.9.2 MINIMIZATION OF CONTAMINATION**

Personnel and equipment used in the contaminated area should be minimized, consistent with effective site operations. Only absolutely required samples will be taken back to the laboratory. Contamination will be avoided wherever possible, by not kneeling on contaminated ground, avoiding puddles where possible, and using plastic drop cloths and equipment covers.

### **9.9.3 SAMPLING PROCEDURES**

Standard operating procedures will minimize the risk of personnel exposure to hazardous materials during sampling, packaging, shipping and analysis; and minimize the risk of exposure of others to spilled or residual waste materials.

#### 9.9.4 SAFETY EQUIPMENT

A first aid kit and fire extinguishers will be available onsite whenever work is being performed. In addition an emergency eyewash and decontamination trailer with showers will be available on site. This equipment will be inspected and/or tested at least monthly and noted in the logbooks. If deficiencies are noted, they will be corrected immediately.

#### 9.9.5 FORBIDDEN ACTIVITIES

- a. Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials in any area designated as contaminated.
- b. Ignition of flammable liquids or starting open flames.
- c. Wearing contact lenses onsite other than in the support zone.
- d. Use of non-prescription controlled substances or alcohol on site.

## 10.0 ENVIRONMENTAL MONITORING PLAN

### 10.1 HAZARDOUS SUBSTANCES MIGRATION PATHWAYS

This section assesses the pathways along which chemicals could escape site boundaries during field operations in the solid, liquid, or vapor state. Solids would most readily escape only if they were small enough and/or light enough to become airborne. In this case, particles would be distributed in a large area downwind from the site. Measures shall be taken to assure that dust levels are kept to a minimum onsite. Decontamination procedures shall be implemented to prevent chemicals from being carried offsite by either personnel or equipment. In addition, air samples may be collected to determine if such transport is occurring (see Air Monitoring and Sampling, Section 10.2). Vapors may escape when contaminated soil is exposed during land treatment operations. This is highly unlikely due to the physical properties of PCP. Air monitoring will be utilized during field operations to determine if chemicals are being carried offsite. In addition, an action level will be established and used to determine if site activities should cease. It is not anticipated that surface liquids would escape the site boundaries. Measures shall be taken to assure that large amounts of liquids do not flow freely offsite.

### 10.2 AIR MONITORING AND SAMPLING

Air monitoring and sampling shall be performed to document exposure levels and to assure that all necessary precautions are taken to protect onsite personnel and the general public. Real-time air monitoring and air sampling shall be conducted during site activities that have a high potential for chemical exposure. In general, the following action levels (Section 10.2.1) will be utilized, subject to modification based on site experience or weather conditions. These action levels are based on readings above the daily background level.

#### 10.2.1 AIR MONITORING

Real-time air monitoring will be conducted using a particulate monitor to measure total dust in air levels. A daily background level will be established by averaging three site readings prior to beginning the day's operations. The site action levels will be determined based on the permissible exposure level (PEL) of PCP. Since the instrument reads the total dust level and cannot readily distinguish between compounds, the site action levels will be determined by comparing the PEL and the greatest concentration of PCP obtained in laboratory samples. Measurement of contaminant air concentrations in the breathing zone above one-half the PEL will result in upgrading to Level C protection for individuals working in proximity to the measured concentrations. Measurement of a sustained air concentration equal to the PEL will result in air monitoring downwind from the work site. If the downwind monitoring indicates potential for offsite exposure, work will cease pending re-evaluation of the task with the client.

Action levels have been established using PCP ( $\text{PEL} = 0.5 \text{ mg/m}^3$ ) as the compound of interest. The quantitative action levels were calculated using the following information:

OSHA PEL	=	$0.5 \text{ mg/m}^3$
Max. Soil Concentration	=	$8400 \text{ mg/kg}$
Worst Case (Dust Storm)	=	$30 \text{ mg/m}^3$

At worst case:

$$\frac{30 \text{ mg}}{\text{mg}} \times \frac{8400 \text{ mg PCP}}{10^6 \text{ mg soil}} = \frac{0.25 \text{ mg PCP}}{\text{m}^3 \text{ air}}$$

The action level for upgrading to level C respiratory protection is one half the PEL of PCP ( $0.25 \text{ mg/m}^3$ ). The site action level will be a total of  $30 \text{ mg/m}^3$  measured on the dust/particulate monitor.

$$\text{R.R.} = \frac{\text{Measured}}{\text{Actual}}$$

**TABLE 10-2. Initial Site Action Levels**

<u>Action</u>	<u>Qualitative Levels</u>	<u>Quantitative Levels (measured)</u>
	<u>Monitor</u>	
Level D	0 ppm to 1/2 PEL in BZ	29 mg/m <sup>3</sup> in BZ
Upgrade to Level C	at 1/2 PEL in BZ	30 mg/m <sup>3</sup> in BZ
Begin Downwind Air Monitoring	at PEL in BZ	60 mg/m <sup>3</sup>
Cease Operations	at PEL (site boundary)	60 mg/m <sup>3</sup> (site boundary)

### 10.2.2 AIR SAMPLING

Personnel air sampling will be conducted to document personnel exposure during site activities. In addition, environmental air samples will be collected upwind and downwind from the site during initial excavating and remediation activities. These sample analysis will be used to document the possibility of offsite migration of hazardous chemicals. Samples will be collected using cellulose membrane and an impinger solution (Ethylene glycol) in midjet impinger bubbler as the sampling media. The pump shall run at 1.5 liters per minute for a total volume of 180 liters (120 minutes). In addition, a bulk sample of soil will be collected in a glass container with a teflon lined cap and sent with the air sampling media. Samples will be sent to Hager Laboratories for analysis of Pentachlorophenol of HPLC method. The sampling method and Hager data sheets are included as attachment 4 and 5 respectively.

### 10.3 HEAT/COLD STRESS MONITORING

Heat stress monitoring will be conducted by the SSO for individuals engaged in heavy manual labor in Level C/ B protection if outside temperatures exceed 70°F. This temperature is lower than the IGCIIH levels for continuous work to compensate for wearing protective clothing which impedes sweat evaporation. Oral temperatures will be taken with a clinical thermometer for three minutes. If the worker's temperature exceeds the TLV for a particular work load and work-rest regimen, the next work period will be shortened by one-third. Radial pulse will also be taken for 30 seconds early in each rest period. If the pulse exceeds 110 beats per minute, the next work cycle will be shortened by one-third. The work-rest regimen and heat exposure TLVs will be according to Table 4-3. Workers will not be permitted to continue working if their temperature exceeds 100.4°F.

**TABLE 10-3. Work-Rest Regimens and Heat Exposure Threshold Limit Values  
(Temp Values given in WBGT)**

<u>Work-Rest Regimen</u>	<u>Work Load</u>		
	<u>Light</u>	<u>Medium</u>	<u>Heavy</u>
Continuous	86°F	80.1°F	77°F
75% Work - 25% Rest Each Hour	87.1°F	82.4°F	78.6°F
50% Work - 50% Rest Each Hour	88.5°F	84.9°F	82.2°F
25% Work - 75% Rest Each Hour	90°F	88°F	86°F

When impermeable protective clothing is being worn, the baseline work cycle should be adjusted so that the work period is one third less than the level recommended in Table 4-3. If outside temperatures fall below 40°F for two consecutive hours during work, a warm shelter will be provided, and breaks will be taken in that area once every two hours.

**ATTACHMENT 1 - FIELD TEAM REVIEW**

## FIELD TEAM REVIEW AND EMERGENCY DATA

I have read and reviewed the most recent revision \_\_\_\_\_  
Date  
of the Health and Safety Plan (HASP) for the \_\_\_\_\_  
Project  
\_\_\_\_\_. I understand the information contained  
Site  
therein and will comply with all aspects of the HASP.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

This information is in case of emergency only:

Social Security # \_\_\_\_\_

Person(s) to notify in case of Emergency:

\_\_\_\_\_

Relationship: \_\_\_\_\_

Daytime Phone #: \_\_\_\_\_

Name of Physician: \_\_\_\_\_ Phone #: \_\_\_\_\_

Medical Coverage: \_\_\_\_\_

\_\_\_\_\_

Employee Data of Birth: \_\_\_\_\_

\*Known Allergies: \_\_\_\_\_

\_\_\_\_\_

\*Known Medical Conditions: \_\_\_\_\_

\_\_\_\_\_

\*any known allergies or medical conditions that physicians should be made aware  
of before medical attention is given (i.e. allergic to penicillin).

**ATTACHMENT 2 - PENTACHLOROPHENOL MSDS**



\*\*\*\*\* IDENTIFIERS \*\*\*\*\*

NAME [CAS NUMBER]: PENTACHLOROPHENOL [87-86-5]

SYNONYMS: CHEM-TOL; CHLOROPHEN; CRYPTOGIL OL; DOWCIDE 7;  
DOWICIDE 7; DOWICIDE EC-7; DOWICIDE G; DOW  
PENTACHLOROPHENOL DF-2 ANTIMICROBIAL; DUROTOX; EP  
30; FUNGIFEN; GLAZD PENTA; GRUNDIER ARBEZOL;  
LAUXTOL; LAUXTOL A; LIROPREM; NCI-C54933;  
NCI-C55378; NCI-C56655; PCP; PENCHLOROL; PENTA;  
PENTACHLOORFENOL (Dutch); PENTACHLOROFENOL;  
PENTACHLOROFENOLO (Italian); PENTACHLOROPHENATE;  
PENTACHLOROPHENOL; 2,3,4,5,6-PENTACHLOROPHENOL;  
PENTACHLOROPHENOL (DOT); PENTACHLOROPHENOL,  
DOWICIDE EC-7; PENTACHLOROPHENOL, DF-2;  
PENTACHLOROPHENOL (German); PENTACHLOROPHENOL,  
TECHNICAL; PENTACON; PENTA-KIL; PENTASOL; PENWAR;  
PERATOX; PERMACIDE; PERMAGARD; PERMASAN; PERMATOX  
DF-2; PERMATOX PENTA; PERMITE; FRILTOX;  
SANTOBRITE; SANTOPHEN; SANTOPHEN 20; SINITUHO;  
TERM-I-TROL; THOMPSON'S WOOD FIX; WEEDONE;  
PHENOL, PENTACHLORO-; PCP, PENTA

RTECS NUMBER: SM6300000 FORMULA: C6Cl5OH CHEMICAL CLASS:

\*\*\*\*\* PROPERTIES \*\*\*\*\*

MELTING POINT: 360 F BOILING POINT: 591.9 F  
WATER SOLUBILITY: 0.002% @ 30 C  
FLASH POINT: NOT COMBUSTIBLE UEL: LEL:  
INCOMPATIBILITIES: STRONG OXIDIZERS  
PHYSICAL DESC: LIGHT-BROWN SOLID WITH A PUNGENT ODOR WHEN HOT  
\*\*\*\*\* TOXICITY DATA \*\*\*\*\*

GNS OF EXPOSURE: DUST OR VAPOR IRRITATES SKIN AND MUCOUS  
MEMBRANES, CAUSING COUGHING AND SNEEZING.  
INGESTION CAUSES LOSS OF APPETITE, RESPIRATORY  
DIFFICULTIES, ANESTHESIA, SWEATING, COMA.  
OVEREXPOSURE CAN CAUSE DEATH. DECREASED URINARY  
OUTPUT. FEVER. INGESTION CAUSE INCREASE THEN  
DECREASE OF RESPIRATION, BLOOD PRESSURE, INCREASE  
BOWEL ACTION, MOTOR WEAKNESS, AND COLLAPSE WITH  
CONVULSIONS, CAUSES LUNG, LIVER, KIDNEY DAMAGE  
AND CONTACT DERMATITIS. Source: CSDS, CHRIS  
LONG TERM TOXICITY: ACUTE POISONING MARKED BY WEAKNESS AND  
RESPIRATORY, BLOOD PRESSURE AND URINARY OUTPUT  
CHANGES - ALSO CAUSES DERMATITIS, CONVULSIONS AND  
COLLAPSE. CHRONIC EXPOSURE CAN CAUSE LIVER AND  
KIDNEY INJURY. Source: SAX  
MEDICAL COND'T AGG: No data available  
TARGET ORGANS: SKIN, MUCOUS MEMBRANE, RESPIRATORY SYSTEM, CNS,  
CARDIOVASCULAR SYSTEM, LIVER, KIDNEYS. Source:  
NIOSH  
CARCINOGEN: Y-POSSIBLE ANIMAL INDEFINITE Source: NIOSH RTECS  
SENSITIZER: No data available  
LD50 (mg/Kg): 50 SPECIES: orl-rat

\*\*\*\*\* REGULATIONS \*\*\*\*\*

RCLA RQ : 10 POUNDS OR 4.54 KG  
A Regs. : Sec. 311 and Sec. 307  
CAA : Not regulated by this act  
RCRA ID : U242  
DOT SHIP NAME : PENTACHLOROPHENOL  
DOT ID : NA2020  
DOT CLASS : OE.

OSHA PEL :

0.5 mg/M3 SKIN

\*\*\*\*\* REGULATORY DATA SUMMARY \*\*\*\*\*  
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CHEMTOX RECORD: 312  
NAME: PENTACHLOROPHENOL  
CAS NUMBER 87-86-5

THIS SUBSTANCE IS REGULATED BY US DOT  
DOT SHIPPING NAME PENTACHLOROPHENOL  
DOT ID NUMBER NA2020  
DOT GUIDE NUMBER 53  
DOT HAZARD CLASS ORM-E

THIS SUBSTANCE IS REGULATED BY US EPA  
UNDER RCRA RULES .. WASTE NUMBER U242  
Under SARA Title III, Section 313 - Release reporting  
UNDER CERCLA RULES WITH 'RQ' OF A or 10 POUNDS  
UNDER CWA Section 311

THIS SUBSTANCE IS REGULATED BY OSHA  
WITH A PEL OF 0.5 mg/M3 SKIN

IMPORTANT: This compound is a known or suspect CARCINOGEN Source: NIOSH

\*\*\*\*\* CHEMTOX TRANSPORTATION DATA SUMMARY \*\*\*\*\*  
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DOT SHIPPING NAME: PENTACHLOROPHENOL  
DOT ID NUMBER: NA2020  
CHEMTOX NAME: PENTACHLOROPHENOL  
DOT GUIDE NUMBER: 53  
MAJOR HAZARD: TOXIC  
FLASH POINT: Not available  
AUTOIGNITION TEMPERATURE: Not available  
UEL: Not available  
LEL: Not available  
PHYSICAL DESCRIPTION: LIGHT-BROWN SOLID WITH A PUNGENT ODOR WHEN HOT  
Source: NIOSH/OSHA Guide  
ODOR DETECTION LOWER LIMIT: NO DATA AVAILABLE Source: CHRIS  
ODOR DESCRIPTION: PUNGENT TO WEAK Source: CHRIS  
PROTECTION SUMMARY: RESPIRATOR FOR DUST; GOGGLES; PROTECTIVE  
CLOTHING. Source: CHRIS Manual  
\*\*\*\*\* LIMIT EXPOSURE, THIS CHEMICAL IS A CARCINOGEN \*\*\*\*\* Source: NIOSH

BZTO104(e)011807

CHEMTOX RECORD NUMBER 312 NAME : PENTACHLOROPHENOL

\*\*\*\*\* CHARACTERISTICS OF THIS CHEMICAL \*\*\*\*\*

ODOR DETECTION LIMIT :NO DATA AVAILABLE Source: CHRIS  
ODOR DESCRIPTION :PUNGENT TO WEAK  
PHYSICAL DESCRIPTION :LIGHT-BROWN SOLID WITH A PUNGENT ODOR WHEN HOT  
Source: CHRIS Manual  
\*\*\*\*\* IMMEDIATE HAZARDS AT SITE OF SPILL \*\*\*\*\*  
(FUNCTION KEYS EXPAND DATA DISPLAY)  
FIRE HAZARD (F1) :  
REACTIVITY HAZARD (F2) :  
TOXICITY HAZARD (F3) :

\*\*\*\*\* SPILL DATA - FLAMMABILITY SUMMARY \*\*\*\*\*  
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CHEMTOX RECORD NUMBER 312 NAME :PENTACHLOROPHENOL  
FLASH POINT (Closed Cup) :Not available  
UPPER EXPLOSIVE LIMIT :Not available  
LOWER EXPLOSIVE LIMIT :Not available  
AUTOIGNITION TEMP :Not available  
TOXIC FIRE GASES :Hydrogen chloride and unburned toxic vapors  
Hazard Code : (0) This material does not readily burn.

Source: CHRIS Manual

\*\*\*\*\* PHYSICAL DATA SUMMARY \*\*\*\*\*  
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CHEMTOX ID NUMBER : 312  
CHEMTOX NAME : PENTACHLOROPHENOL  
CAS NUMBER : 87-86-5  
CHEMICAL CLASS :  
FORMULA : C6Cl5OH  
MOLECULAR WEIGHT : 266.32  
PHYSICAL DESCRIPTION : LIGHT-BROWN SOLID WITH A PUNGENT ODOR WHEN HOT  
BOILING POINT : 591.9 F  
MELTING POINT : 360 F  
VAPOR PRESSURE : 40 MM @ 211 C  
WATER SOLUBILITY : 0.002% @ 30 C  
SPECIFIC GRAVITY : 1.98 @ 22 C  
IONIZATION POTENTIAL : Not available  
FLASH POINT (CC) : Not available  
UEL : Not available  
LEL : Not available  
AUTOIGNITION TEMP : Not available  
Sources: CHRIS Manual AND NIOSH/OSHA Guide

\*\*\*\*\* CHEMTOX REACTIVITY DATA \*\*\*\*\*  
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CHEMTOX RECORD :312  
 NAME :PENTACHLOROPHENOL  
 CAS NUMBER :87-86-5  
 FORMULA :C6Cl5OH  
 CHEMICAL CLASS :  
 INCOMPATIBILITIES :STRONG OXIDIZERS  
 REACTIVITY TO WATER :Not reactive, or unknown.  
 REACTIVITY WITH  
 COMMON MATERIALS :No reactions of a hazardous nature.  
 NEUTRALIZATION :Not applicable.  
 TOXIC FIRE GASES :Hydrogen chloride and unburned toxic vapors  
 Sources: CHRIS Manual  
 and NIOSH/OSHA Guide

\*\*\*\*\* CHEMTOX TOXICOLOGICAL DATA \*\*\*\*\*  
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CHEMTOX RECORD :312  
 NAME :PENTACHLOROPHENOL  
 CAS NUMBER :87-86-5  
 IDLH :150 MG/M3 Source: NIOSH  
 OSHA DATA :FEL= 0.5 mg/M3  
 TGIH TLV :- ppm SKIN STEL : 1.5 mg/M3  
 TARGET ORGANS :SKIN, MUCOUS MEMBRANE, RESPIRATORY SYSTEM, CNS,  
 CARDIOVASCULAR SYSTEM, LIVER, KIDNEYS. Source: NIOSH  
 SHORT TERM TOX :A HUMAN CNS/SKIN IRRITANT. \*\* Source: SAX  
 LONG TERM TOX :ACUTE POISONING MARKED BY WEAKNESS AND RESPIRATORY,  
 BLOOD PRESSURE AND URINARY OUTPUT CHANGES - ALSO CAUSES  
 DERMATITIS, CONVULSIONS AND COLLAPSE. CHRONIC EXPOSURE  
 CAN CAUSE LIVER AND KIDNEY INJURY. \*\* Source: SAX  
 MEDICAL CONDITION  
 AGGRAVATED :No data available  
 SIGNS/SYMPTOMS :DUST OR VAPOR IRRITATES SKIN AND MUCOUS MEMBRANES,  
 CAUSING COUGHING AND SNEEZING. INGESTION CAUSES LOSS  
 OF APPETITE, RESPIRATORY DIFFICULTIES, ANESTHESIA,  
 SWEATING, COMA. OVEREXPOSURE CAN CAUSE DEATH. DECREASED  
 SWEATING, COMA. OVEREXPOSURE CAN CAUSE DEATH. DECREASED  
 URINARY OUTPUT. FEVER. INGESTION CAUSE INCREASE THEN  
 DECREASE OF RESPIRATION, BLOOD PRESSURE, INCREASE  
 BOWEL ACTION, MOTOR WEAKNESS, AND COLLAPSE WITH  
 CONVULSIONS, CAUSES LUNG, LIVER, KIDNEY DAMAGE AND  
 CONTACT DERMATITIS. Source: CSDS, CHRIS  
 LD50 (mg/Kg) :50 SPECIES: orl-rat Source: SAX

\*\*\*\*\* PERSONNEL PROTECTION SUMMARY \*\*\*\*\*

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EMTOX RECORD : - 312

CAS NUMBER: 87-86-5

NAME : PENTACHLOROPHENOL

\*\* WEAR APPROPRIATE EQUIPMENT TO PREVENT:

Any possibility of liquid contact and repeated or prolonged vapor contact with the skin.

\*\* WEAR EYE PROTECTION TO PREVENT:

\*\* EXPOSED PERSONNEL SHOULD WASH:

Immediately when skin becomes contaminated.

\*\* WORK CLOTHING SHOULD BE CHANGED DAILY:

If there is any possibility that the clothing may be contaminated.

\*\* REMOVE CLOTHING:

Immediately remove non-impervious clothing that becomes contaminated.

\*\* THE FOLLOWING EQUIPMENT SHOULD BE MADE AVAILABLE:

Eyewash, quick drench.

\*\* REFERENCE: NIOSH

RESPIRATOR FOR DUST; GOGGLES; PROTECTIVE CLOTHING.

\*\* REFERENCE: CHRIS MANUAL

NIOSH RESPIRATION PROTECTION RECOMMENDATIONS

OSHA (PENTACHLOROPHENOL)

5 mg/M3: Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust, mist and fume filter. \* Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. \* Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. \* Substance reported to cause eye irritation or damage may require eye protection.

12.5 mg/M3: Any supplied-air respirator operated in a continuous flow mode. \* Substance reported to cause eye irritation or damage may require eye protection. / Any powered air-purifying respirator with organic vapor cartridge(s) in combination with a dust, mist, and fume filter. \* Substance reported to cause eye irritation or damage may require eye protection.

25 mg/M3: Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter. / Any supplied-air respirator with a full facepiece. / Any self-contained breathing apparatus with a full facepiece.

150 mg/M3: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister having a high-efficiency particulate filter. / Any appropriate escape-type self-contained breathing apparatus.

\*\*\*\*\* SYMPTOMS OF EXPOSURE \*\*\*\*\*  
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CHEMTOX RECORD :312  
NAME :PENTACHLOROPHENOL  
CAS :87-86-5  
GENERAL SYMPTOMS:

DUST OR VAPOR IRRITATES SKIN AND MUCOUS MEMBRANES,  
CAUSING COUGHING AND SNEEZING. INGESTION CAUSES  
LOSS OF APPETITE, RESPIRATORY DIFFICULTIES, ANESTHESIA,  
SWEATING, COMA. OVEREXPOSURE CAN CAUSE DEATH.  
DECREASED URINARY OUTPUT. FEVER. INGESTION CAUSE  
INCREASE THEN DECREASE OF RESPIRATION, BLOOD  
PRESSURE, INCREASE BOWEL ACTION, MOTOR WEAKNESS,  
AND COLLAPSE WITH CONVULSIONS, CAUSES LUNG, LIVER,  
KIDNEY DAMAGE AND CONTACT DERMATITIS. Source:  
CSDS, CHRIS

\*\*\*\*\* CHEMTOX ANALYTICAL DATA \*\*\*\*\*  
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CHEMTOX RECORD NUMBER 312 NAME : PENTACHLOROPHENOL

ANALYTICAL METHODS RECOMMENDED BY NIOSH or OSHA

Agency	Reference	Method
NIOSH	4(S297)	HPLC
OSHA	39	HPLC/UV



S4034 -01  
Effective: 10/08/85

Sodium Hydroxide

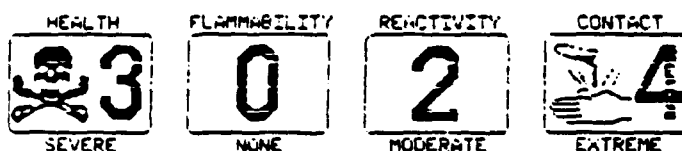
Page: 1  
Issued: 10/19/85

SECTION I - PRODUCT IDENTIFICATION

Product Name: Sodium Hydroxide  
Formula: NaOH  
Formula Wt: 40.00  
CAS No.: 01310-73-2  
NIOSH/RECS No.: WB4900000  
Common Synonyms: Caustic Soda Sodium Hydrate; Lye  
Product Codes: 3730, 3722, 5312, 5104, 3729, 3734, 3726, 5045, 3728, 3723, 5022, 3731

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA™ System



Laboratory Protective Equipment



Precautionary Label Statements

POISON! DANGER!  
CAUSES SEVERE BURNS  
MAY BE FATAL IF SWALLOWED

Do not get in eyes, on skin, on clothing.  
Avoid breathing dust. Keep in tightly closed container. Use with adequate ventilation. Wash thoroughly after handling.

SECTION II - HAZARDOUS COMPONENTS

Component	%	CAS No.
Sodium Hydroxide	90-100	1310-73-1

SECTION III - PHYSICAL DATA

Boiling Point:	1390°C ( 2534°F)	Vapor Pressure(mmHg): 0
Melting Point:	318°C ( 604°F)	Vapor Density(air=1): N/A

Continued on Page: 2





# J. T. Baker Chemical Co.

222 Red School Lane Phillipsburg, N.J. 08865  
24-Hour Emergency Telephone - (201) 859-2151  
Chemtrec # (800) 424-9300  
National Response Center # (800) 424-8802

## MATERIAL SAFETY DATA SHEET

4034 -01  
Effective: 10/09/85

Sodium Hydroxide

Page: 2  
Issued: 10/09/85

### SECTION III - PHYSICAL DATA (Continued)

Specific Gravity: 2.13  
(H<sub>2</sub>O=1)

Evaporation Rate: N/A  
(Butyl Acetate=1)

Solubility(H<sub>2</sub>O): Appreciable (more than 10 %) & Volatiles by Volume: 0

Appearance & Odor: White, odorless solid (flakes).

### SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A NFPA 704M Rating: 3-0-1

Fire Extinguishing Media  
Use water spray.

### Usual Fire & Explosion Hazards

Contact with moisture or water may generate sufficient heat to  
ignite combustible materials.  
Reacts violently with water liberating and igniting hydrogen.

### SECTION V - HEALTH HAZARD DATA

Threshold Limit Value (TLV/TWA): 2 mg/m<sup>3</sup> ( ppm)

### Effects of Overexposure

Ingestion may result in severe intestinal irritation with burns to  
mouth.  
Contact with skin or eyes may cause severe irritation or burns.

### Emergency and First Aid Procedures

If swallowed, do NOT induce vomiting; if conscious, give large amounts of  
water. Follow with diluted vinegar, fruit juice or whites of eggs, beaten  
with water.  
In case of contact, immediately flush eyes or skin with plenty of water for  
at least 15 minutes while removing contaminated clothing and shoes.  
Wash clothing before re-use.

### SECTION VI - REACTIVITY DATA

Stability: Stable Hazardous Polymerization: Will not occur

Conditions to Avoid: moisture

Incompatibles: water, strong acids, most common metals.

Continued on Page: 3

BZTO104(e)011813

# J. T. Baker Chemical Co.

222 Red School Lane Phillipsburg, N.J. 08865  
24-Hour Emergency Telephone - (201) 859-2151

Chemtrec # (800) 424-9300  
National Response Center # (800) 424-8802

## MATERIAL SAFETY DATA SHEET

S4034 -01

Sodium Hydroxide

Page: 1

Effective: 10/08/85

Issued: 10/03/85

### SECTION VII - SPILL AND DISPOSAL PROCEDURES

#### Steps to be taken in the event of a spill or discharge

Wear self-contained breathing apparatus and full protective clothing.  
With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

J. T. Baker Neutracid-2<sup>R</sup> caustic neutralizer is recommended for spills of this product.

#### Disposal Procedure

Dispose in accordance with all applicable federal, state, and local environmental regulations.

EPA Hazardous Waste Number: D002, D003 (Corrosive, Reactive Waste)

### SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

Ventilation: Use general or local exhaust ventilation to meet TLV requirements.

Respiratory Protection: Respiratory protection required if airborne concentration exceeds TLV. At concentrations up to 60 ppm, a high-efficiency particulate respirator is recommended. Above this level, a self-contained breathing apparatus is advised.

Eye/Skin Protection: Safety goggles, uniform, apron, rubber gloves are recommended.

### SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA<sup>TM</sup> Storage Color Code: White Stripes

#### Special Precautions

Keep container tightly closed. Store in corrosion-proof area.

### SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

#### DOMESTIC (D.O.T.)

Proper Shipping Name	Sodium hydroxide, dry solid
Hazard Class	Corrosive material (solid)
UN/NA	UN1823
Labels	CORROSIVE
Reportable Quantity	1000 LBS.

#### INTERNATIONAL (I.M.O.)

Proper Shipping Name	Sodium hydroxide, solid
----------------------	-------------------------

Continued on Page: 4

BZTO104(e)011814



# J. T. Baker Chemical Co.

222 Red School Lane Phillipsburg, N.J. 08865  
24-Hour Emergency Telephone - (201) 859-2151  
Chemtrec # (800) 424-9300  
National Response Center # (800) 424-8802

**MATERIAL  
SAFETY DATA  
SHEET**

S4034 -01

Sodium Hydroxide

Page: 4

Effective: 10/08/85

Issued: 10/09/85

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (Continued)

Hazard Class 8  
UN/NA UN1823  
Labels CORROSIVE

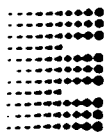
N/A = Not Applicable or Not Available

---  
The information published in this Material Safety Data Sheet has been compiled from our experience and data presented in various technical publications. It is the user's responsibility to determine the suitability of this information for the adoption of necessary safety precautions. We reserve the right to revise Material Safety Data Sheets periodically as new information becomes available.

-- LAST PAGE --

BZTO104(e)011815

### **ATTACHMENT 3 - TAILGATE SAFETY MEETING**



ECOVA

# TAILGATE SAFETY MEETING

Division/Subsidiary \_\_\_\_\_ Facility \_\_\_\_\_

Date \_\_\_\_\_ Time \_\_\_\_\_ Job Number \_\_\_\_\_

Customer \_\_\_\_\_ Address: \_\_\_\_\_

Specific Location \_\_\_\_\_

Type of Work \_\_\_\_\_

Chemicals Used \_\_\_\_\_

## SAFETY TOPICS PRESENTED

Protective Clothing/Equipment \_\_\_\_\_

Chemical Hazards \_\_\_\_\_

Physical Hazards \_\_\_\_\_

Emergency Procedures \_\_\_\_\_

Hospital / Clinic \_\_\_\_\_ Phone ( ) \_\_\_\_\_ Paramedic Phone ( ) \_\_\_\_\_

Hospital Address \_\_\_\_\_

Special Equipment \_\_\_\_\_

Other \_\_\_\_\_

## ATTENDEES

NAME PRINTED

SIGNATURE

_____
_____
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_____
_____
_____

meeting conducted by:

NAME PRINTED

SIGNATURE

Supervisor \_\_\_\_\_

Manager \_\_\_\_\_

BZTO104(e)011817

## **ATTACHMENT 4 - SAMPLING METHOD**

## Pentachlorophenol

---

Analyte:	Pentachlorophenol	Method No.: S297
Matrix:	Air	Range: 0.265-1.130 mg/cu m
OSHA Standard:	0.5 mg/cu m - skin	Precision ( $\overline{CV}_T$ ): 0.072
Procedure:	Filter and bubbler collection, ethylene glycol extraction, HPLC	Validation Date: 12/23/77

---

### 1. Principle of the Method

- 1.1 A known volume of air is drawn through a mixed cellulose ester membrane filter connected in series to a midget bubbler containing 15 ml of ethylene glycol to collect pentachlorophenol.
- 1.2 The filter and bubbler are disconnected. The filter is removed from the filter holder and added to the bubbler flask.
- 1.3 Just before analysis, ten milliliters of methanol is added to the bubbler flask. The resulting sample is analyzed by high performance liquid chromatography using a UV detector set at 254 nm.

### 2. Range and Sensitivity

- 2.1 This method was validated over the range of 0.2654-1.131 mg/cu m at an atmospheric temperature of 24°C and pressure of 761 mm Hg, using 180-liter samples.
- 2.2 The upper limit of the range of the method is dependent on the capacity and collection efficiency of the sampling system. The method may be extended to higher values than those tested by dilution of the sample solution.

### 3. Interferences

- 3.1 When interfering compounds are known or suspected to be present in the air, such information, including their suspected identities, should be transmitted with the sample.
- 3.2 Any compound that has the same retention time as pentachlorophenol at the operating conditions described in this method is an interference. Retention time data on a single column cannot be considered proof of chemical identity.

#### 4. Precision and Accuracy

- 4.1 The Coefficient of Variation ( $\overline{CV}_T$ ) for the total sampling and analytical method in the range of 0.2654-1.131 mg/cu m was 0.0721. This value corresponds to a standard deviation of 0.036 mg/cu m at the OSHA standard level. Statistical information can be found in Reference 11.1. Details of the test procedures can be found in Reference 11.2.
- 4.2 A collection efficiency of at least 99% was determined for the collection media (filter and bubbler in series), thus, no significant bias was introduced in the sample collection step. There was also no bias in the analytical method. The average recovery from the filters was 100.9%. The average recovery from samples that were stored eight days was 95.3%. Thus,  $\overline{CV}_T$  is a satisfactory measure of both accuracy and precision of the sampling and analytical method.

#### 5. Advantages and Disadvantages of the Method

- 5.1 Collected samples are analyzed by means of a quick, instrumental method.
- 5.2 A disadvantage of the method is the awkwardness in using midget bubblers for collecting personal samples. If the worker's job performance requires much body movement, loss of the collection solution during sampling may occur.
- 5.3 The precision of the method is limited by the reproducibility of the pressure drop across the filter and bubbler. This drop will affect the flow rate and cause the volume to be imprecise, because the pump is usually calibrated for one filter/bubbler combination only.
- 5.4 The bubblers are more difficult to ship than adsorption tubes or filters due to possible breakage and leakage of the bubblers during shipping.

#### 6. Apparatus

- 6.1 Filter Units. The filter unit consists of a 37-mm diameter cellulose ester membrane filter (Millipore Type AA or equivalent) with a pore size of 0.80 micrometer, supported by a stainless steel screen on a 37-mm three-piece filter holder. It is important that a stainless steel screen be used since other filter supports may retain part of the vapor.
- 6.2 Flexible Teflon or polyethylene tubing to connect the holder to the bubbler.
- 6.3 A glass midget bubbler containing 15 ml of ethylene glycol.



- 6.4 Personal Sampling Pump. A calibrated personal sampling pump whose flow can be determined within  $\pm 5\%$  is used. The sampling pump is protected from splashover or solvent condensation by a second empty bubbler positioned between the exit arm of the first bubbler and the pump.
- 6.5 Barometer.
- 6.6 Thermometer.
- 6.7 High performance liquid chromatograph capable of UV detection at a wavelength of 254 nm and a sample injection valve with a 20-microliter external sample loop.
- 6.8 Column (30-cm x 3.9-mm I.D. stainless steel) packed with  $\mu$ Bondapak C<sub>18</sub>. The porous packing material consists of silica particles with a bonded coating of C<sub>18</sub> organo-silane. This packing can be obtained from Waters Associates, Milford, Massachusetts.
- 6.9 An electronic integrator or some other suitable method for measuring peak areas.
- 6.10 Tweezers.
- 6.11 Microliter syringes, 50 and 100-microliter.
- 6.12 Volumetric flasks, convenient sizes for preparing standard solutions.
- 6.13 Pipets, convenient sizes for preparing standard solutions and 10 and 15-ml pipets for measuring the extraction medium.
- 6.14 Teflon tubing (15-cm long x 7-mm I.D.) or Teflon plugs for sealing the inlet and outlet of the bubbler stem before shipping.

## 7. Reagents

All reagents used must be ACS reagent grade or better.

- 7.1 Pentachlorophenol.
- 7.2 Dowicide EC-7 (purified pentachlorophenol).
- 7.3 Ethylene glycol.
- 7.4 Methanol, distilled in glass.
- 7.5 Isopropanol.
- 7.6 Water, deionized and distilled.

## 8. Procedure

8.1 Cleaning of Equipment. All glassware used for the laboratory analysis should be detergent washed and thoroughly rinsed with tap water and distilled water, and dried.

8.2 Calibration of Personal Sampling Pumps. Each personal sampling pump must be calibrated with a representative filter holder, bubbler and splashover trap in the line to minimize errors associated with uncertainties in the volume sampled.

### 8.3 Collection and Shipping of Samples

8.3.1 Assemble the filter in the three-piece filter holder and close firmly. The filter is backed up by a stainless steel screen. Secure the filter holder together with tape or shrinkable band.

8.3.2 Pipet 15 ml of ethylene glycol into each midget bubbler, and mark the liquid level. Be sure that the bubbler frit is completely immersed in the ethylene glycol.

8.3.3 Remove the filter holder plugs and attach the outlet of the filter holder to the inlet arm of the midget bubbler using a short piece of flexible polyethylene or Teflon tubing. Connect the outlet arm of the midget bubbler to a second empty bubbler and then to the personal sampling pump, using short pieces of flexible tubing. The bubblers must be maintained in a vertical position during sampling.

8.3.4 Air being sampled should not pass through any hose or tubing before entering the filter holder.

\* 8.3.5 A sample size of 180 liters is recommended. Sample at a flow rate of 1.5 liters per minute. The flow rate should be known to within  $\pm 5\%$ .

8.3.6 Turn the pump on and begin sample collection. Since it is possible for a filter to become plugged by heavy particulate loading or by the presence of oil mists or other liquids in the air, the pump rotameter should be checked frequently and readjusted as needed. Sampling should be terminated when the rotameter cannot be readjusted.

8.3.7 Terminate sampling at the predetermined time and record sample flow rate, collection time and ambient temperature and pressure. If pressure reading is not available, record the elevation. Also record the type of sampling pump used.

- \* 8.3.8 After sampling, disconnect the filter and bubblers. Remove first the bubbler stem, and remove the filter from the filter holder with clean tweezers and add it to the bubbler. It is necessary to place the filter in the bubbler solution at this time, otherwise loss of pentachlorophenol from the filter by vaporization might occur. Replace the bubbler stem. The inlet and outlet of the bubbler stem should be sealed by connecting a piece of Teflon tubing between them or inserting Teflon plugs in the inlet and outlet. Do not seal with rubber. The splashover trap should have the inlet and outlet of the bubbler stem sealed in a similar manner. The standard taper joint of the bubblers should be taped securely to prevent leakage during shipping.
- ↓
- 8.3.9 With each batch or partial batch of ten samples submit one bubbler containing ethylene glycol and a blank filter from the same lot of filters used for sample collection. This filter and bubbler must be subjected to exactly the same handling as the samples except that no air is drawn through them. Label this filter and bubbler as the blank.
- \* 8.3.10 The bubblers should be shipped in a suitable container, designed to prevent damage in transit. The samples should be shipped to the laboratory as soon as possible.
- ↓
- 8.3.11 Bulk Sample. A bulk sample of the suspected material should be submitted to the laboratory in a glass container closed by a Teflon-lined cap. Label of the bulk sample should match air samples for identification purposes.
- 8.4 Analysis of Samples
- 8.4.1 If the sample volume is less than 15 ml, add ethylene glycol until the volume reaches the 15-ml mark. If the sample volume is more than 15 ml, determine the volume and make an appropriate volume correction in the calculations indicated in Section 10.1.
- 8.4.2 Add 10 ml of methanol to each sample just before analysis and mix the solution gently but thoroughly.
- 8.4.3 HPLC Conditions. The typical operating conditions for the high pressure liquid chromatograph are:

Column Temperature: Ambient  
Column Pressure: 2300 psi  
Flow Rate: 1.6 ml/min  
Mobile Phase: 60% methanol/40% water (V/V)  
Detector: UV photometer at 254 nm  
Capacity Ratio: 1.8

8.4.4 Injection. The first step in the analysis is to inject the sample into the high pressure liquid chromatograph. The chromatograph is fitted with a sample injection valve and a 20-microliter sample loop. Flush this loop thoroughly with solvent (300 microliters), then fill the loop with sample solution and inject.

8.4.5 The area of the sample peak is measured by an electronic integrator or some other suitable form of area measurement, and results are read from a standard curve prepared as discussed below.

## 8.5 Determination of Analytical Method Recovery

8.5.1 Need for Determination. To eliminate any bias in the analytical method, it is necessary to determine the recovery of the compound. The sample recovery should be determined in duplicate and should cover the concentration range of interest. If the recovery is less than 95%, the appropriate correction factor should be used to calculate the "true" value.

8.5.2 Procedure for Determining Recovery. A known amount of the analyte, preferably equivalent to the sample concentration expected, is added to a representative cellulose membrane filter and air-dried. The filter is then immediately placed into 15 ml of ethylene glycol. Prior to analysis, as described in Section 8.4, 10 ml of methanol is added.

For the validation studies conducted to determine the precision and accuracy of this method, an amount of the analyte equivalent to that present in a 180-liter sample at the selected level was used to determine the analytical method recovery. A stock solution containing 10.00 milligrams of pentachlorophenol per milliliter of isopropanol was prepared. Aliquots of 4.5, 9 and 18 microliters were added to the cellulose membrane filters and air-dried to produce samples equivalent to 180-liter collections at 0.5, 1 and 2X the OSHA standard level. The analytical samples were then placed in 15 ml of ethylene glycol and allowed to stand overnight. A parallel blank filter was also prepared except that no sample was added to it. Just prior to analysis, as described in Section 8.4, 10 ml of methanol was added.

The sample recovery equals the average weight in  $\mu\text{g}$  recovered from the filter divided by the weight in  $\mu\text{g}$  added to the filter, or

$$\text{Recovery} = \frac{\text{Average Weight } (\mu\text{g}) \text{ recovered} - \text{Blank } (\mu\text{g})}{\text{Weight } (\mu\text{g}) \text{ added}}$$

The recovery value is used in Section 10.3 if the recovery is less than 95%.

## 9. Calibration and Standards

A series of standards, varying in concentration over the range corresponding to approximately 0.25 to 3 times the OSHA standard for the sample under study, is prepared and analyzed under the same LC conditions and during the same time period as the unknown samples. Curves are established by plotting concentration in  $\mu\text{g}/25\text{ ml}$  versus peak area. Note: Since no internal standard is used in this method, standard solutions must be analyzed at the same time as the samples. This will minimize the effect of known day-to-day variations and variations during the same day of the UV detector response.

9.1 Prepare a 10 mg/ml pentachlorophenol stock standard solution by dissolving 100 mg pentachlorophenol in isopropanol and diluting to 10 ml in a volumetric flask.

9.2 From the above stock solution, appropriate aliquots are withdrawn and added to a mixture of 15 ml ethylene glycol and 10 ml methanol. Prepare at least five working standards to cover the range of 22.5-270  $\mu\text{g}/25\text{ ml}$ . This range is based on a 180-liter sample. Analyze samples as per Section 8.4.

9.3 Prepare a standard calibration curve by plotting concentration of pentachlorophenol in  $\mu\text{g}/25\text{ ml}$  versus peak area.

## 10. Calculations

10.1 Read the weight, in  $\mu\text{g}/25\text{ ml}$ , corresponding to each peak area from the appropriate standard curve. No volume correction is needed, because the standard curve is based on  $\mu\text{g}/25\text{ ml}$  of ethylene glycol/methanol and the volume of sample injected is identical to the volume of the standards injected.

10.2 A correction for the blank must be made for each sample.

$$\mu\text{g} = \mu\text{g sample} - \mu\text{g blank}$$

where:

$$\mu\text{g sample} = \mu\text{g found in sample solution}$$

$$\mu\text{g blank} = \mu\text{g found in blank solution}$$

10.3 Divide the total weight by the recovery (Section 8.5.2) to obtain the corrected  $\mu\text{g}/\text{sample}$ .

$$\text{Corrected } \mu\text{g/sample} = \frac{\text{Total Weight}}{\text{Recovery}}$$

- 10.4 For personal sampling pumps with rotameters only, the following volume correction should be made:

$$\text{Corrected Volume} = f \times t \left( \sqrt{\frac{P_1}{P_2} \times \frac{T_2}{T_1}} \right)$$

where:

- $f$  = sampling flow rate
- $t$  = sampling time
- $P_1$  = pressure during calibration of sampling pump (mm Hg)
- $P_2$  = pressure of air sampled (mm Hg)
- $T_1$  = temperature during calibration of sampling pump ( $^{\circ}\text{K}$ )
- $T_2$  = temperature of air sampled ( $^{\circ}\text{K}$ )

- 10.5 The concentration of pentachlorophenol in the air sample can be expressed in mg/cu m.

$$\text{mg/cu m} = \frac{\text{Corrected } \mu\text{g (Section 10.3)} \times 1000 \text{ (liters/cu m)}}{\text{Corr. Air Volume Sampled (liters) (Section 10.4)}}$$

## 11. References

- 11.1 Documentation of NIOSH Validation Tests, National Institute for Occupational Safety and Health, Cincinnati, Ohio (DHEW-NIOSH-Publication No. 77-185), 1977. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., Order No. 017-033-00231-2.
- 11.2 Backup Data Report for Pentachlorophenol, prepared under NIOSH Contract No. 210-76-0123.

## **ATTACHMENT 5 - HAGER LABORATORIES DATA SHEET**



**HAGER**  
LABORATORIES, INC.

11234 East Coley Avenue  
Englewood, Colorado 80111  
(303) 790-2727 (303) 282-1835  
FAX # (303) 790-2756

HAGER SERVICE NUMBER \_\_\_\_\_

(lab use only)      IH    EN    AH    AN    BT

YOUR CUSTOMER ID CODE \_\_\_\_\_  
(optional)

Samples Submitted By:

Company  
Name \_\_\_\_\_

Address \_\_\_\_\_

City, State \_\_\_\_\_

Zipcode \_\_\_\_\_

Telephone \_\_\_\_\_

Contact \_\_\_\_\_

( ) Mr ( ) Ms ( ) Mrs ( ) Dr

Please check one

( ) Check here if above info has changed

Original of Report Same ( ) or To:

\_\_\_\_\_

\_\_\_\_\_

Send mailers ( ), data sheets ( ), labels ( ), Other ( ) \_\_\_\_\_

Special Instructions

**Asbestos Analyses**

- ( ) Standard Service
- ( ) 48-Hour Rush Service\*
- ( ) 24-Hour Rush Service\*
- ( ) 2-Hour Rush Plus Service\*
- ( ) Phone Results
- ( ) Special Report Format or Information (see back).  
May require additional fee.

\* Additional Fee

**Other Analyses**

- ( ) Standard Service
- ( ) Rush Service\*
- ( ) Rush Plus Service\*
- ( ) Phone Results
- ( ) GC/Mass Spectroscopy\*
- ( ) Special Report Format or Information (see back).  
May require additional fee.

\* Additional Fee

Sample Information

1. Samples were mailed in \_\_\_\_\_ on \_\_\_\_\_  
(number mailers/boxes) (date)
2. If sampling media is not standard charcoal tube, cellulose or PVC filters please describe \_\_\_\_\_
3. If samples for hydrocarbon mixtures (petroleum distillates, Solvesso 100 etc.) or oil mist, a 2-3cc bulk sample is required. This should be sent in a separate mailer. List any bulk sent \_\_\_\_\_

TOLL FREE 1-800-282-1835 or inside COLORADO (303) 790-2727

1106: 7

BZTO104(e)011828



\* Please indicate type of turnaround service requested; i.e., Standard, Rush, 48-hour, 24-hour, or 2-hour service.

## ■ Brief Sample Descriptions Alleviate Possible Errors In Reporting

\*\*\* When using POVM's we need only the time exposed under "Air volume".

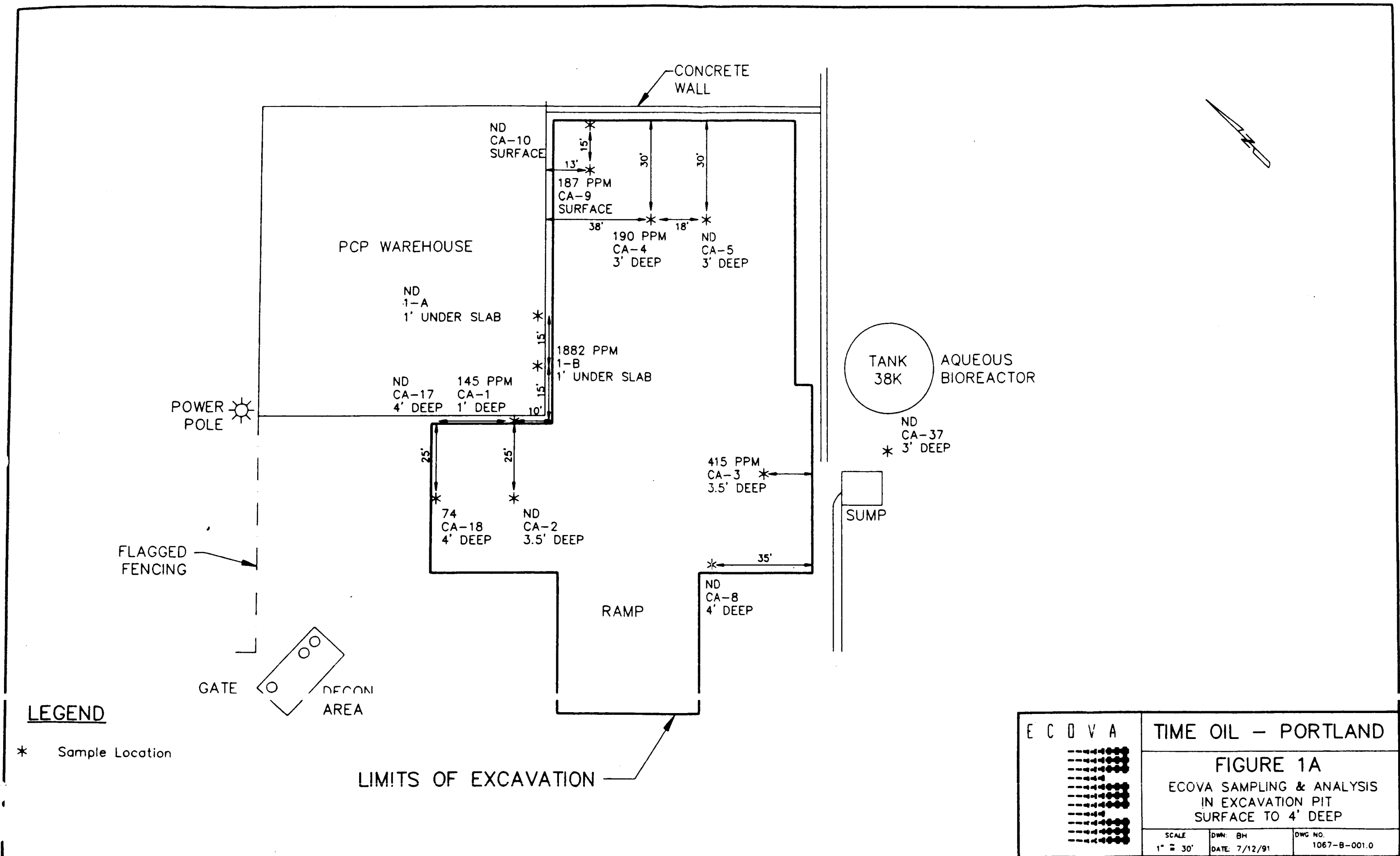
[illegible]

### Optional Information

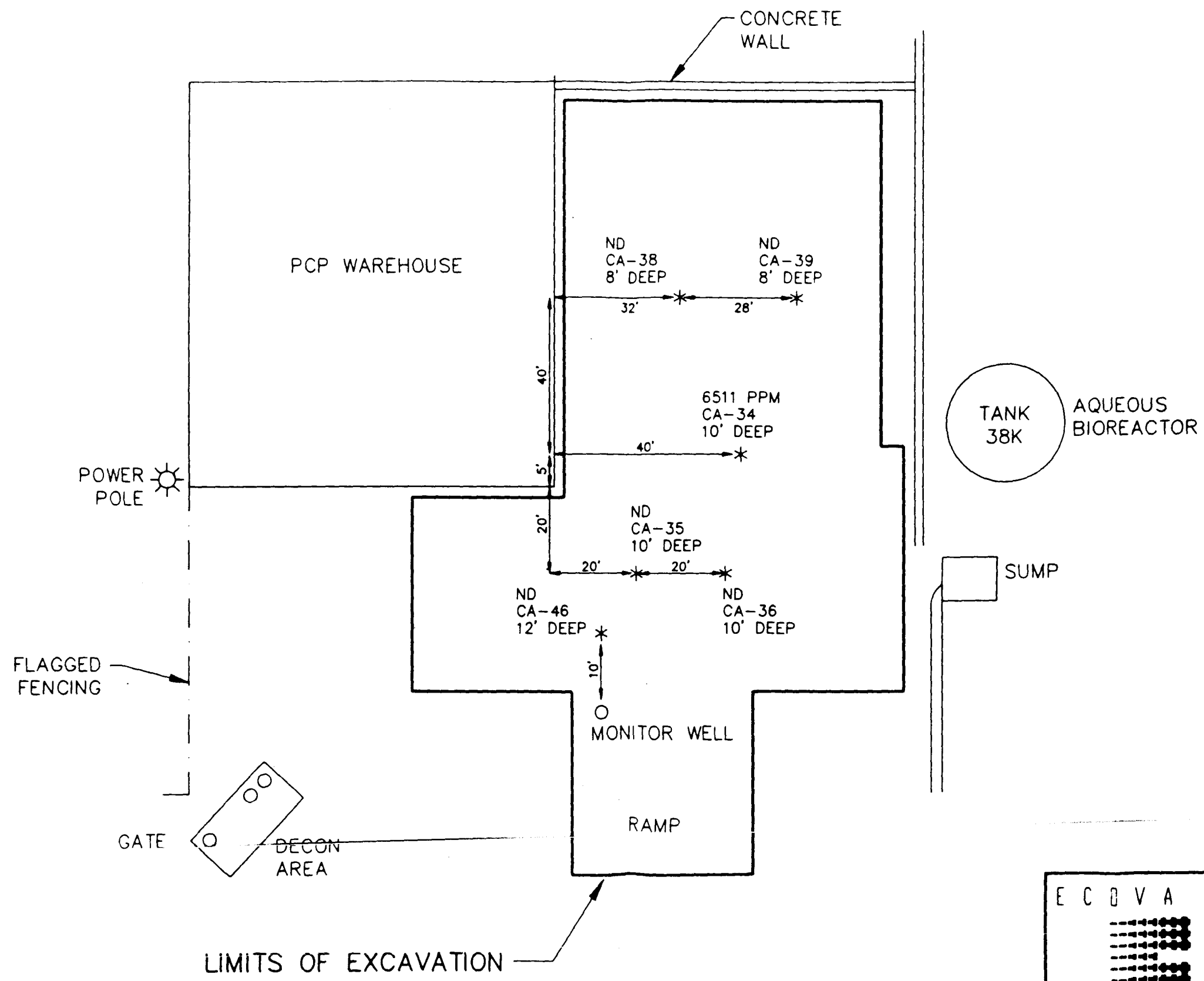
What other compounds, not normally found in the air, may have been present in the sampled air?

If sampling occurred at an altitude greater than 1000 feet AND you would like air volumes to be corrected for altitude, provide sampling altitude here.

**ADDITIONAL REPORTING REQUIREMENTS:**



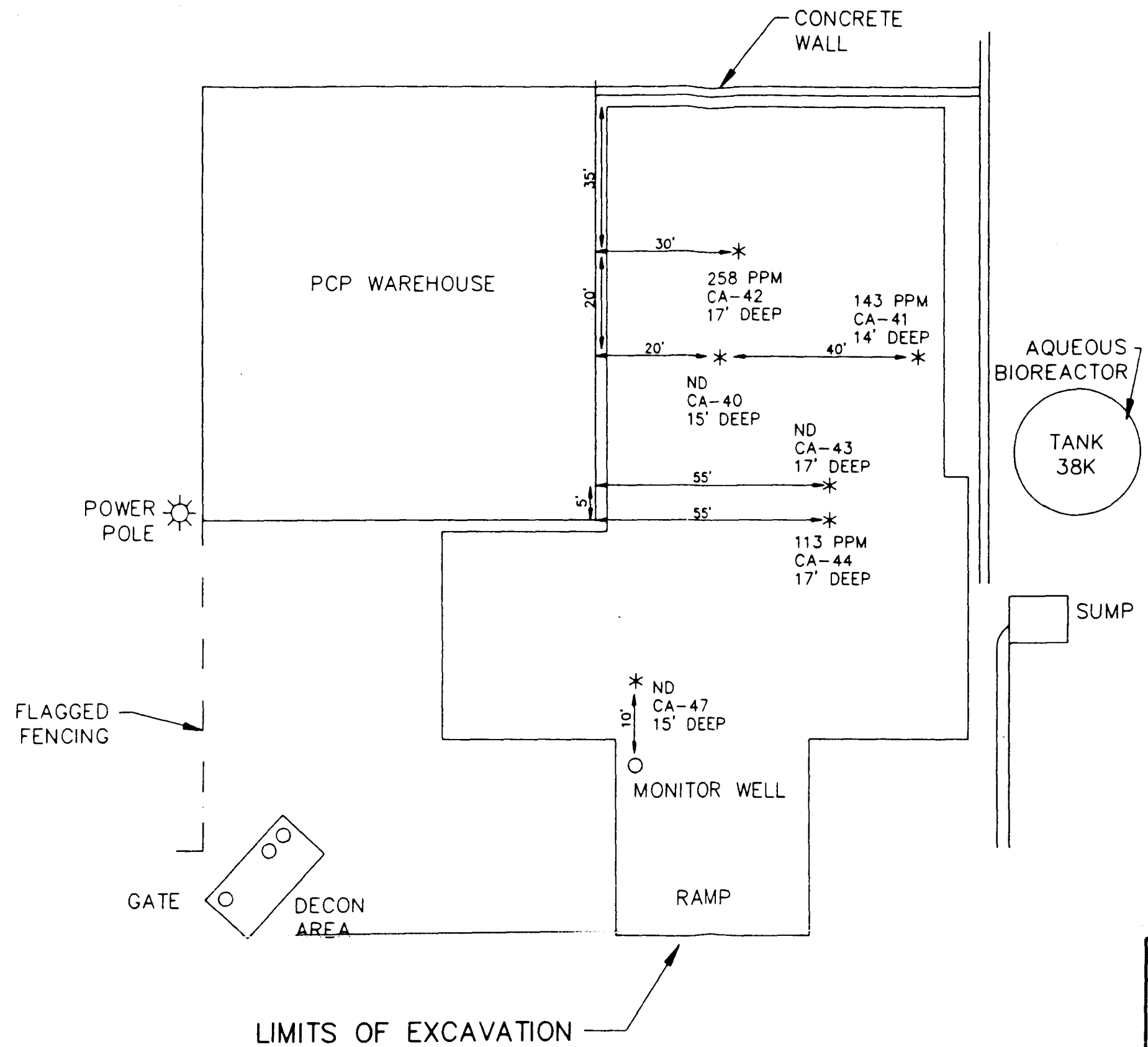




**LEGEND**

\* Sample Location

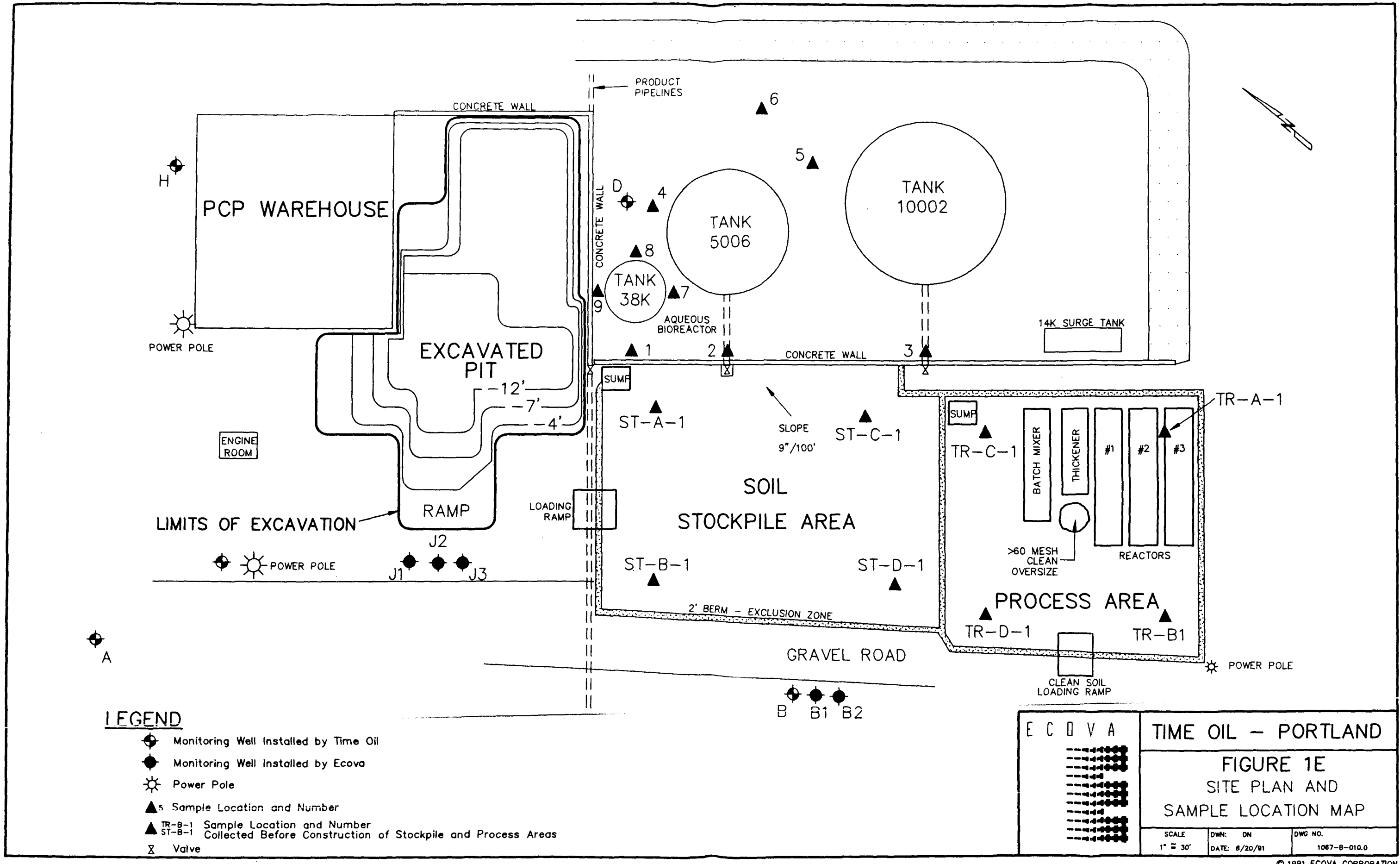
E C O V A		TIME OIL - PORTLAND	
FIGURE 1C			
ECOVA SAMPLING & ANALYSIS IN EXCAVATION PIT 8' TO 12' GRADE			
SCALE 1" = 30'	DWN. BH DATE 7/12/91	DWG NO 1067-B-003.0	

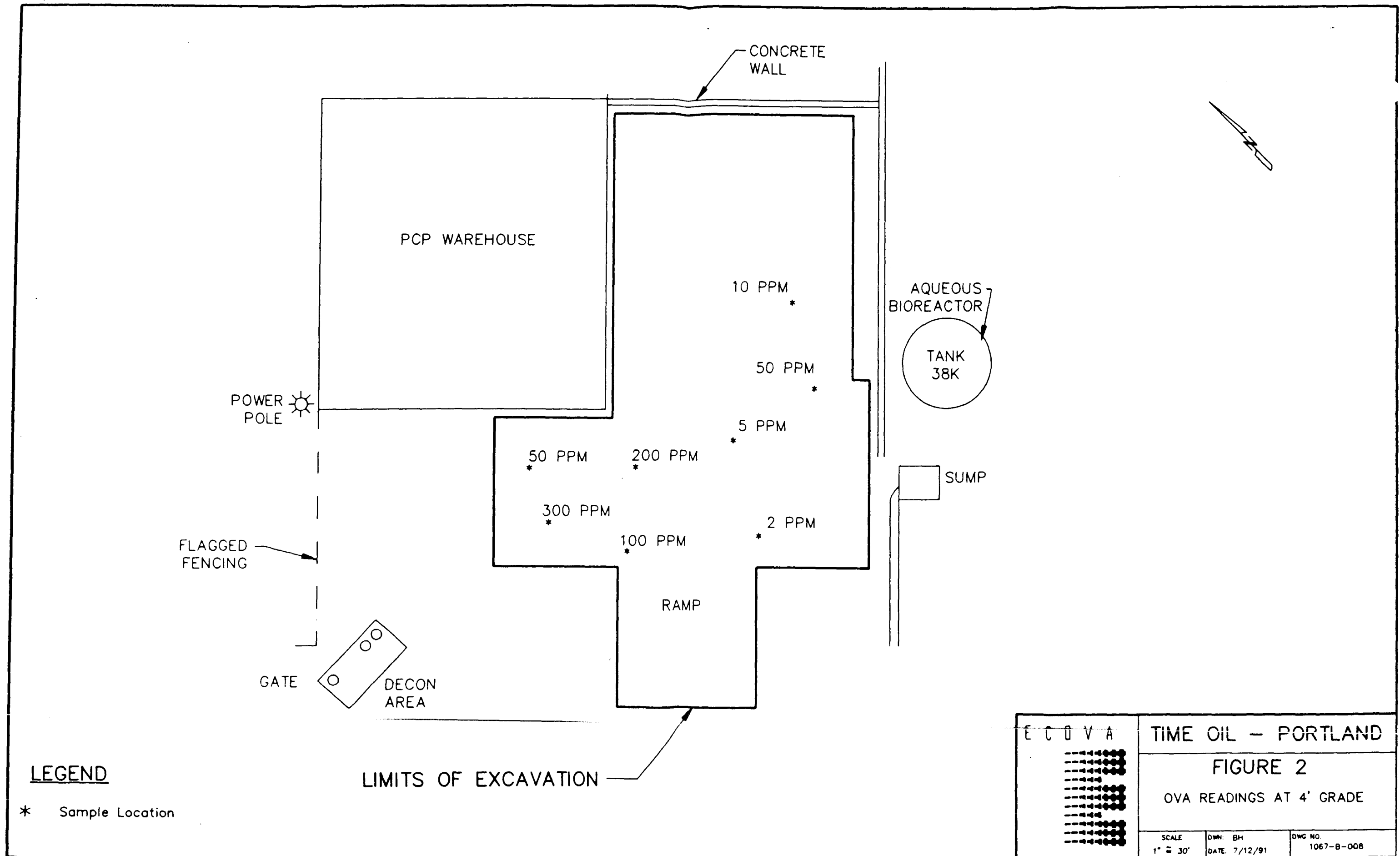


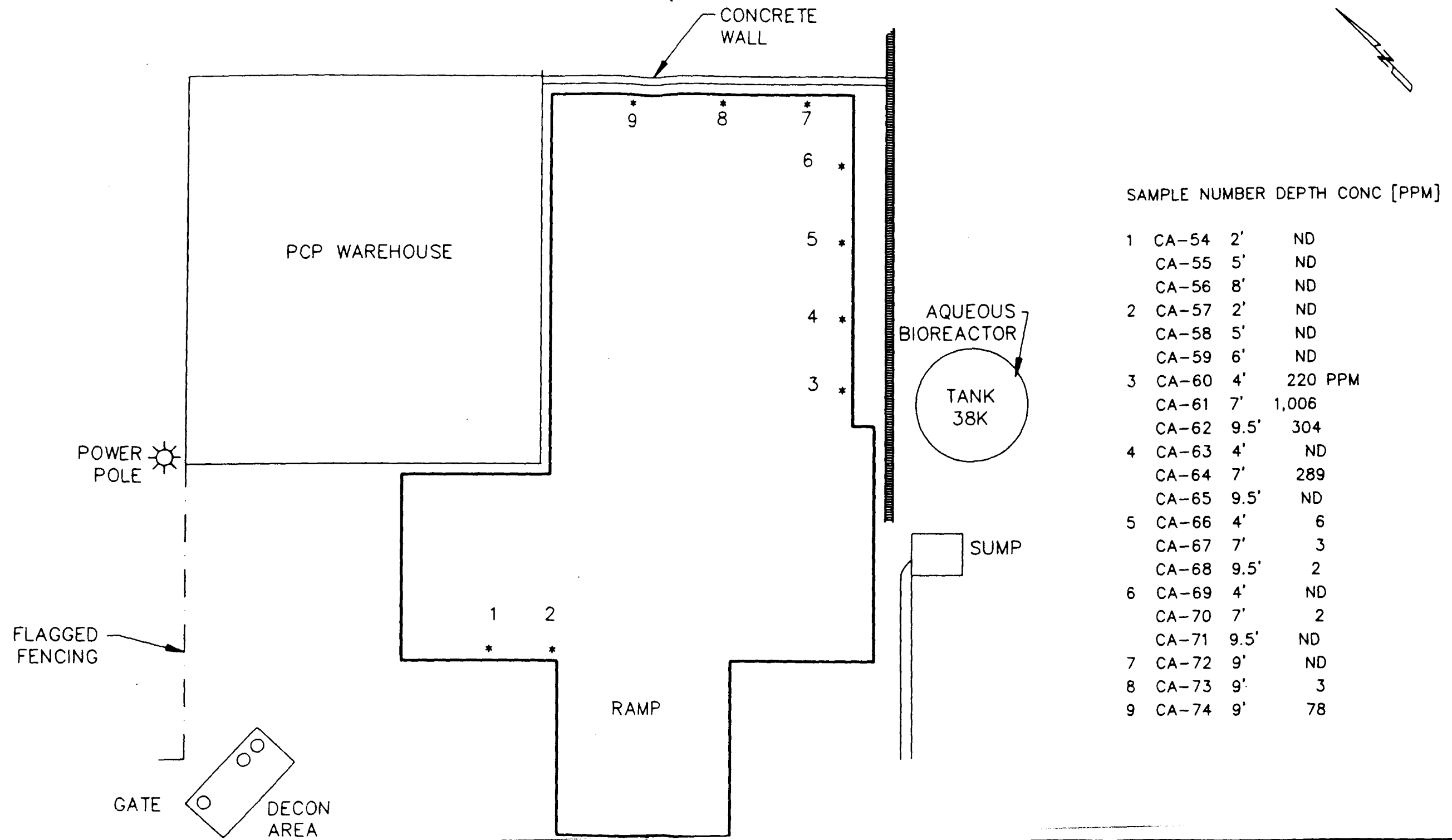
**LEGEND**

\* Sample Location

<div> <div>ECOVA</div> <div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div> </div>	TIME OIL - PORTLAND	
	<b>FIGURE 1D</b> ECOVA SAMPLING & ANALYSIS IN EXCAVATION PIT 14' TO 17' GRADE	
	SCALE 1" = 30'	DWN: BM DATE 7/12/91 DWG NO 1067-B-004.0







SAMPLE NUMBER DEPTH CONC [PPM]

1	CA-54	2'	ND
	CA-55	5'	ND
	CA-56	8'	ND
2	CA-57	2'	ND
	CA-58	5'	ND
	CA-59	6'	ND
3	CA-60	4'	220 PPM
	CA-61	7'	1,006
	CA-62	9.5'	304
4	CA-63	4'	ND
	CA-64	7'	289
	CA-65	9.5'	ND
5	CA-66	4'	6
	CA-67	7'	3
	CA-68	9.5'	2
6	CA-69	4'	ND
	CA-70	7'	2
	CA-71	9.5'	ND
7	CA-72	9'	ND
8	CA-73	9'	3
9	CA-74	9'	78

LEGEND

† Sample Location

E C O V A

TIME OIL - PORTLAND

FIGURE 3

SIDE WALL SAMPLES

SCALE

1" = 30'

DWN: BH

DATE: 7/12/91

DWG NO.

1067-B-009.0



TABLE 1. APPENDIX I

SAMPLE NUMBER	DEPTH	PENTACHLOROPHENOL CONCENTRATION
		(parts per million)
1	Surface Sample	2424
2	Surface Sample	14.2
3	Surface Sample	4.9
4	Surface Sample	ND
5	Surface Sample	ND
6	Surface Sample	ND
7	Surface Sample	ND
8	Surface Sample	ND
9	Surface Sample	ND
ST-A-1	Surface Sample	ND
ST-B-1	Surface Sample	ND
ST-C-1	Surface Sample	ND
ST-D-1	Surface Sample	ND
TR-A-1	Surface Sample	ND
TR-B-1	Surface Sample	ND
TR-C-1	Surface Sample	ND
TR-D-1	Surface Sample	ND
1-A	Surface Under Warehouse	ND
1-B	Surface-Under Warehouse	1882
CA-1	1' Deep	145
CA-2	3.5' Deep	ND
CA-3	3.5' Deep	415
CA-4	3' Deep	190
CA-5	3' Deep	ND
CA-8	4' Deep	ND



CA-9	Surface Sample	187
CA-10	Surface Sample	ND
CA-11	7' Deep	828
CA-12	7' Deep	2693
CA-13	7' Deep	6
CA-14	7' Deep	15
CA-15	7' Deep	68
CA-16	7' Deep	ND
CA-17	4' Deep	ND
CA-18	4' Deep	74
CA-19	7' Deep	42
CA-20	7' Deep	670
CA-21	7' Deep	480
CA-22	7' Deep	196
CA-23	7' Deep	ND
CA-24	7' Deep	107
CA-25	7' Deep	1027
CA-26	7' Deep	186
CA-27	7' Deep	374
CA-28	7' Deep	418
CA-29	7' Deep	243
CA-30	7' Deep	293
CA-31	7' Deep	64
CA-32	7' Deep	305
CA-33	7' Deep	ND
CA-34	10' Deep	6511
CA-35	10' Deep	ND
CA-36	10' Deep	ND
CA-37	3' Deep	ND



CA-38	8' Deep	ND
CA-39	8' Deep	ND
CA-40	15' Deep	ND
CA-41	14' Deep	143
CA-42	17' Deep	258
CA-43	17' Deep	ND
CA-44	17' Deep	114
CA-45	6' Deep	ND
CA-46	12' Deep	ND
CA-47	15' Deep	ND

Excavation Side Wall

CA-54	2' Deep	ND
CA-55	5' Deep	ND
CA-56	8' Deep	ND
CA-57	2' Deep	ND
CA-58	5' Deep	ND
CA-59	6' Deep	ND
CA-60	4' Deep	220
CA-61	7' Deep	1006
CA-62	9.5' Deep	304
CA-63	4' Deep	ND
CA-64	7' Deep	289
CA-65	9.5' Deep	ND
CA-66	4' Deep	6
CA-67	7' Deep	3
CA-68	9.5' Deep	2
CA-69	4' Deep	ND



CA-70	7' Deep	2
CA-71	9.5' Deep	ND
CA-72	9' Deep	ND
CA-73	9' Deep	3
CA-74	9' Deep	78



## DESCRIPTION OF SAMPLES TAKEN DURING SOIL EXCAVATION

Samples 1 through 6 were surface samples taken on January 10, 1989, around tanks 38009, 5006, and 10002 to the south of the PCP Mixing Area. Tank 38009, at various times, was used for storing PCP solutions. Only samples 1, 2, and 3 contained measureable amounts of PCP (2424, 14.2, and 4.9 mg/kg respectively).

Samples ST-A-1, B-1, C-1, D-1 and TR-A-1, B-1, C-1, D-1 were collected on January 11 to verify soil contamination prior to laying down the tarp which lined the bermed areas. All samples were surface samples and analyzed Non Detect for PCP.

On January 11, 1989 samples were taken from under the PCP Warehouse. These are samples numbered 1-A and 1-B. They were taken at the surface of the soil, but excavated laterally 1 foot under the warehouse. Sample 1-A was Non Detect, and 1-B measured 1882 mg/kg.

On January 16, 1991, in an effort to more clearly define the extent of contamination surrounding Tank 38009, three more surface samples were taken, sample numbers 7, 8, and 9. These samples all analyzed Non Detect for PCP.

On January 19, 1989 excavation of the contaminated soil began. Samples CA-1, 2, and 3 were also collected at that time. CA-1 and 2 were collected to the northwest of the PCP Mixing Area at depths of 1 foot and 3.5 feet respectively, while CA-3 was taken at a depth of 3.5 feet from under the approximate location of the bulkhead which formed the western border of the PCP Mixing Area. These samples contained significant PCP concentrations - 145 mg/kg, Non Detect, and 415 mg/kg for CA-1, 2, and 3 respectively.

Samples CA-4 and 5 were taken on January 22 at a depth of 3 feet from the east end of the contaminated area. Sample 4 contained 190 mg/kg PCP, while CA-5 did not contain detectable amounts.

On January 25 sample CA-8 was collected from the western perimeter of the contaminated area at a depth of 4 feet, and samples CA-9 and 10 were taken from the surface in the northwest corner. CA-8 contained no detectable concentrations of PCP; and when viewed in combination with the analysis of samples CA-2 and ST-B-1, which were also Non Detect, the beginning of a western limit on the area of contamination is apparent. CA-9 contained 3459 mg/kg of PCP and CA-10 was also non detect.

By this time the contaminated soil had been excavated to a depth of 4 feet throughout the area of contamination. An OVA Meter (Organic Vapor Analyzer) was used to measure any vapors given off by the soil at this level. Meter readings indicated that vapors with concentrations from 2 to 50 ppm were being emitted by the soil. This information is shown in Appendix I, Figure 2.

On January 28 the excavation had reached a depth of 7 feet. Samples CA-11, 12, 13, and

14 were taken at this point and analyzed 828, 2693, 6, and 15 mg/kg respectively. On January 30 two more samples were taken at the 7 foot level, CA-15 and 16, which analyzed 68 mg/kg and Non Detect, respectively. On February 7 samples CA-17, 18, and 19 were collected at the 7 foot level and analyzed Non Detect, 74, and 42 mg/kg respectively.

On February 7, 1989, a matrix of samples was collected at the 7 foot level which indicated persistent contamination, except in the southern border of the excavation. A test excavation of a small area of the pit to the 10 foot level analyzed high (6511 mg/kg) concentrations of PCP. However, excavating the entire pit to the 10 foot level and taking samples CA-35, 36, 37, 38, and 39 showed that contamination was decreasing - all measured Non Detect. Samples taken from depths of 17 feet (CA-42, 43, and 44), 6 feet (CA-45), 12 feet (CA-46), and 15 feet (CA-47) tested 258 mg/kg, Non Detect, 114 mg/kg, Non Detect, Non Detect, and Non Detect, respectively.

These deeper samples (in excess of 13 feet) were below the water table and showed that some contamination may exist in that region. Primarily due to practical considerations of the difficulty of excavating soil below the water table, no excavation was attempted below the water table and vertical excavation was halted.

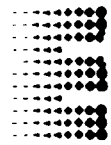
To verify that horizontal excavation was sufficient, side wall samples were taken in the pit. These were samples CA-54 through CA-74. These samples were taken in the northwest corner of the pit, and south wall and the east wall. No samples were taken near the warehouse because the presence of contaminated soil under the warehouse had been confirmed, but excavation in that direction had been halted in order to avoid structural damage to the building. It is worth pointing out that contaminated soils beneath the warehouse are effectively shielded (capped) from surface water and rain, and the potential for migration of these contaminants is reduced significantly.

All samples taken in the northwest corner (CA-54 through 59) analyzed Non Detect, showing that the limits of contamination in that direction had been reached.

Samples on the east wall tested 78 mg/kg, 3 mg/kg, and Non Detect for samples taken approximately 15, 30, and 45 feet from the warehouse. Excavation in this direction was halted due to the presence of the warehouse, and the concrete retaining wall.

On the south wall, concentrations of 220, 1006, 304, 0, and 289 mg/kg PCP existed in samples CA-60, 61, 62, 63, and 64, respectively. Excavation in this direction was halted primarily due to fear of causing a collapse of Tank 38009, but also due to the concrete retaining wall.

Sampling and analysis indicated that all contaminated material had been removed that would not adversely impact buildings and facilities. For that reason, excavation was halted and backfill with clean soil from another location on site was initiated.



ECOVA

CHAIN-OF-CUSTODY RECORD

R/A Control No. \_\_\_\_\_

C/C Control No. 0001924

PROJECT NAME/NUMBER \_\_\_\_\_

LAB DESTINATION \_\_\_\_\_

SAMPLE TEAM MEMBERS \_\_\_\_\_

CARRIER/WAYBILL NO. \_\_\_\_\_

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No

Special Instructions: \_\_\_\_\_

Possible Sample Hazards: \_\_\_\_\_

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: \_\_\_\_\_

3. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received by: \_\_\_\_\_

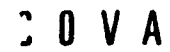
2. Relinquished By: \_\_\_\_\_

4. Relinquished By: \_\_\_\_\_

Received By: \_\_\_\_\_

Received By: \_\_\_\_\_

WHITE - To accompany samples  
YELLOW - Field copy



R/A Control No. **N° 6977**  
C/C Control No. \_\_\_\_\_

DATE SAMPLES SHIPPED \_\_\_\_\_

LAB DESTINATION \_\_\_\_\_

LABORATORY CONTACT \_\_\_\_\_

SEND LAB REPORT TO \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

DATE REPORT REQUIRED \_\_\_\_\_

PROJECT CONTACT \_\_\_\_\_

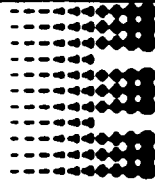
PROJECT CONTACT PHONE NO. \_\_\_\_\_

[illegible]

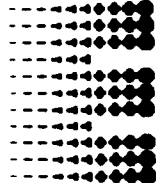
WHITE - Ori  
YELLOW - F



Sample Label

	Proj. Name: _____ #: _____
	Date: _____ Time: _____
	Sample #: _____ Samplers Initials: _____
	Site Comments: _____ _____
Known Hazards: _____ _____	

Chain-of-Custody Seal

<b>CUSTODY SEAL</b>			15555 N.E. 33rd Redmond, WA 98052 (206) 882-4364
_____	DATE		
_____	SIGNATURE		

**SEMI-VOLATILE DATA FACT SHEET**  
**QC SUMMARY**

20  
SOIL SEMIVOLATILE SURROGATE RECOVERY

DL Name: PNELI

	EPA	S1	S2	S3	S4	S5	S6	OTHER	TOT
	SAMPLE NO.	(NBZ)#	(FBP)#	(TPH)#	(PHL)#	(2FP)#	(TBP)#		OUT
01	2081-01	72	77	77	74	63	73		0
02	2081-01MS	79	82	77	79	74	81		0
03	2081-01MSD	70	77	74	72	67	78		0
04	2081-02	51	62	74	57	45	81		0
05	2081-03	211 *	89	74	112	111	91		1
06	2081-03DL	237 *	89	78	98	84	80		1
07	2081-00MB	67	74	84	73	63	74		0
08	2070-00MB2	64	60	65	69	58	67		0
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QC LIMITS

S1 (NBZ) = Nitrobenzene-d5 (23-120)

S2 (FBP) = 2-Fluorobiphenyl (30-115)

S3 (TPH) = Terphenyl-d14 (18-137)

S4 (PHL) = Phenol-d5 (24-113)

S5 (2FP) = 2-Fluorophenol (25-121)

S6 (TBP) = 2,4,6-Tribromophenol (19-122)

# Column to be used to flag recovery values

\* Values outside of contract required QC limits

D Surrogates diluted out

3D  
SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

a Name: PNELI Contract: \_\_\_\_\_  
b Code: PNELI Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
Matrix Spike - Sample No.: 2081-01 Level: (low/med) LOW

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Phenol	8700.00	0.00	4700.00	54	126- 90
2-Chlorophenol	8700.00	0.00	5300.00	61	125-102
1,4-Dichlorobenzene	4400.00	0.00	2800.00	64	128-104
N-Nitroso-di-n-prop.(1)	4400.00	0.00	2500.00	57	141-126
1,2,4-Trichlorobenzene	4400.00	0.00	3400.00	77	138-107
4-Chloro-3-methylphenol	8700.00	0.00	5800.00	67	126-103
Acenaphthene	4400.00	0.00	2900.00	66	131-137
4-Nitrophenol	8700.00	0.00	6300.00	72	111-114
2,4-Dinitrotoluene	4400.00	0.00	4000.00	91 *	128- 89
Pentachlorophenol	8700.00	3400.00	9800.00	74	117-109
Pyrene	4400.00	0.00	2900.00	66	135-142

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD REC.
Phenol	8700.00	4300.00	49	10	35 126- 90
2-Chlorophenol	8700.00	4900.00	56	8	50 125-102
1,4-Dichlorobenzene	4400.00	2600.00	59	8	27 128-104
N-Nitroso-di-n-prop.(1)	4400.00	2500.00	57	0	38 141-126
1,2,4-Trichlorobenzene	4400.00	3200.00	73	5	23 138-107
4-Chloro-3-methylphenol	8700.00	5700.00	66	2	33 126-103
Acenaphthene	4400.00	2800.00	64	3	19 131-137
4-Nitrophenol	8700.00	6200.00	71	1	50 111-114
2,4-Dinitrotoluene	4400.00	3800.00	86	6	47 128- 89
Pentachlorophenol	8700.00	8900.00	63	16	47 117-109
Pyrene	4400.00	2600.00	59	11	36 135-142

1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk  
Values outside of qc limits

PD: 0 out of 11 outside limits  
p Recovery: 1 out of 22 outside limits

COMMENTS: \_\_\_\_\_  
\_\_\_\_\_

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: PNELI\_\_\_\_\_ Client No.: 891005-10\_\_\_\_\_  
Lab Code: PNELI\_\_\_ Case No.: 2081\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
Lab File ID: BF518\_\_\_\_\_ Lab Sample ID: 2081-00MB\_\_\_\_\_  
Date Extracted: 10/09/89 Extraction: (SepF/Cont/Sonc) SONG  
Date Analyzed: 10/10/89 Time Analyzed: 1141\_\_\_\_\_  
Matrix: (soil/water) SOIL\_\_\_ Level: (low/med) LOW\_\_\_  
Instrument ID: GCMS\_D\_\_\_\_\_-

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

EPA	LAB	LAB	DATE
SAMPLE NO.	SAMPLE ID	FILE ID	ANALYZED
01:T1-3-926-15	2081-01	BF520	10/10/89
02:T1-3-926-15M	2081-01MS	BF523	10/10/89
03:T1-3-926-15M	2081-01MSD	BF524	10/10/89
04:T3-1-928-15	2081-03	BF525	10/10/89
05:T3-1-928-15D	2081-03DL	BF546	10/11/89

COMMENTS:

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: PNELI\_\_\_\_\_ Client No.: 891005-10\_\_\_\_\_  
 Lab Code: PNELI\_\_\_ Case No.: 2081\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
 Lab File ID: BF553\_\_\_\_\_ Lab Sample ID: 2081-00MB2\_\_\_\_\_  
 Date Extracted: 10/11/89 Extraction: (SepF/Cont/Sonc) SONC  
 Date Analyzed: 10/12/89 Time Analyzed: 1048\_\_\_\_\_  
 Matrix: (soil/water) SOIL\_\_\_ Level: (low/med) LOW\_\_\_  
 Instrument ID: GCMS\_D\_\_\_ - - - - -

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	T2-2-927-15	2081-02	BF556	10/12/89

COMMENTS:

5B  
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS  
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

L Name: PNELI Contract: \_\_\_\_\_  
Lab Code: PNELI Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
Lab File ID: >BF494 DFTPP Injection Date: 10/09/89  
Instrument ID: 2 DFTPP Injection Time: 6:55

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	44.8(
68	Less than 2.0% of mass 69	0.0 0.0)1
69	Mass 69 relative abundance	57.(
70	Less than 2.0% of mass 69	.2 .4)1
127	40.0 - 60.0% of mass 198	43.2
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.5
275	10.0 - 30.0% of mass 198	21.3
365	Greater than 1.00% of mass 198	2.12
441	Present, but less than mass 443	8.4
2	Greater than 40.0% of mass 198	55.3(
3	17.0 - 23.0% of mass 442	9.9 17.9)2

1-Value is % mass 69 2-Value is % mass 442

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD50	>BF495	10/09/89	7:13
02	SSTD20	>BF496	10/09/89	8:32
03	SSTD80	>BF497	10/09/89	9:34
04	SSTD120	>BF498	10/09/89	10:36
05	SSTD160	>BF499	10/09/89	11:44
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58  
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS  
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Name: PNELI Contract: \_\_\_\_\_  
a Code: PNELI Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
b File ID: >BF514 DFTPP Injection Date: 10/10/89  
Instrument ID: 2 DFTPP Injection Time: 7:00

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	39.60
69	Less than 2.0% of mass 69	0.0 0.0)1
69	Mass 69 relative abundance	52.0
70	Less than 2.0% of mass 69	.7 1.3)1
127	40.0 - 60.0% of mass 198	42.3
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	7.1
275	10.0 - 30.0% of mass 198	21.0
365	Greater than 1.00% of mass 198	1.84
441	Present, but less than mass 443	7.1
442	Greater than 40.0% of mass 198	46.90
443	17.0 - 23.0% of mass 442	8.7 18.6)2

1-Value is % mass 69 2-Value is % mass 442

41. TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD50	>BF515	10/10/89	8:26
02	2062-01	>BF516	10/10/89	9:34
03	2078-01RE	>BF517	10/10/89	10:36
04	2081-00	>BF518	10/10/89	11:43
05	2062-02	>BF519	10/10/89	12:44
06	2081-01	>BF520	10/10/89	13:44
07	2081-02	>BF521	10/10/89	15:50
08	2081-03	>BF522	10/10/89	16:52
09	2081-04	>BF523	10/10/89	17:54
10	2081-05	>BF524	10/10/89	18:56
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58  
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS  
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Name: PNELI Contract: \_\_\_\_\_  
Lab Code: PNELI Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
Lab File ID: >BF536 DFTPP Injection Date: 10/11/89  
Instrument ID: 2 DFTPP Injection Time: 7:01

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	40.4(
69	Less than 2.0% of mass 69	0.0 0.0)1
69	Mass 69 relative abundance	48.(
70	Less than 2.0% of mass 69	0.0 0.0)1
127	40.0 - 60.0% of mass 198	45.5
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	6.7
275	10.0 - 30.0% of mass 198	21.4
365	Greater than 1.00% of mass 198	2.22
441	Present, but less than mass 443	9.1
	Greater than 40.0% of mass 198	58.0(
	17.0 - 23.0% of mass 442	10.8 18.7)2

1-Value is % mass 69 2-Value is % mass 442

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD50	>BF538	10/11/89	8:27
02	2062-03	>BF543	10/11/89	14:02
03	SBLK2	>BF544	10/11/89	15:04
04	<del>2081-03</del>	<del>&gt;BF545</del>	<del>10/11/89</del>	<del>16:07</del>
05	<del>2081-03</del>	<del>&gt;BF546</del>	<del>10/11/89</del>	<del>17:09</del>
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5B  
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS  
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Sample Name: PNELI Contract: \_\_\_\_\_  
Lab Code: PNELI Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: \_\_\_\_\_  
Lab File ID: >BF549 DFTPP Injection Date: 10/12/89  
Instrument ID: 2 DFTPP Injection Time: 7:06

Line	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
61	30.0 - 60.0% of mass 198	38.40
68	Less than 2.0% of mass 69	0.0 0.0)1
69	Mass 69 relative abundance	51.0
70	Less than 2.0% of mass 69	.8 1.7)1
127	40.0 - 60.0% of mass 198	40.2
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 - 9.0% of mass 198	5.8
275	10.0 - 30.0% of mass 198	21.9
365	Greater than 1.00% of mass 198	2.37
441	Present, but less than mass 443	9.3
442	Greater than 40.0% of mass 198	57.90
	17.0 - 23.0% of mass 442	10.7 18.5)2

1-Value is % mass 69 2-Value is % mass 442

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD50	>BF550	10/12/89	7:31
02	EDZ81MSD	>BF551	10/12/89	8:40
03	2067-00MB	>BF552	10/12/89	9:45
04	<del>2070-00MS</del>	<del>&gt;BF553</del>	<del>10/12/89</del>	<del>10:40</del>
05	2070-01MS	>BF555	10/12/89	12:57
06	<del>2081-00MS</del>	<del>&gt;BF556</del>	<del>10/12/89</del>	<del>14:00</del>
07	EDZ80RE	>BF557	10/12/89	15:03
08	2067-02	>BF558	10/12/89	16:05
09	EDZ97	>BF559	10/12/89	17:08
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22	ZZZ			

Initial Calibration Data  
HSL Compounds

No: \_\_\_\_\_ Instrument ID: GC/MS D  
 Contractor: ECOVA \_\_\_\_\_ Calibration Date: 10/09/89  
 Contract No: \_\_\_\_\_

Minimum RF for SPCC is 0.05 Maximum % RSD for CCC is 30.0%

Laboratory ID: >BF496 >BF495 >BF497 >BF498 >BF499		RF	RF	RF	RF	RF	RRT	RF	% RSD	CCC	SPCC
Compound		20.00	50.00	80.00	120.00	160.00					
C550	2-Fluorophenol	1.38807	1.36030	1.34151	1.26887	1.21069	.763	1.31389	5.527		
C545	Phenol-d5	1.55405	1.59039	1.53236	1.43107	1.37433	.936	1.49644	6.035		
C315	Phenol	2.07490	1.99375	1.82141	1.62292	1.53842	.939	1.81028	12.742	*	
C325	bis(2-Chloroethyl)ether	1.67564	1.62339	1.59380	1.51230	1.48333	.952	1.57753	5.021		
C330	2-Chlorophenol	1.45416	1.52100	1.47090	1.41473	1.35407	.965	1.44297	4.341		
C335	1,3-Dichlorobenzene	1.55356	1.54245	1.48609	1.40642	1.31176	.994	1.46005	6.941		
C340	1,4-Dichlorobenzene	1.56870	1.57729	1.52529	1.36260	1.28640	1.003	1.46406	8.996	*	
C345	Benzyl alcohol	.81822	.96313	.92428	.90607	.91662	1.029	.90566	5.899		
C350	1,2-Dichlorobenzene	1.55089	1.55264	1.48088	1.37163	1.30236	1.040	1.45168	7.670		
C355	2-Methylphenol	1.37305	1.35367	1.32508	1.22971	1.18969	1.054	1.29424	6.204		
C360	bis(2chloroisopropyl)eth	2.82089	2.82858	2.68072	2.54446	2.39804	1.060	2.65454	6.960		
C365	4-Methylphenol	1.39835	1.41507	1.34144	1.26623	1.24455	1.082	1.33313	5.732		
	N-Nitroso-di-n-propylam	1.25651	1.28858	1.25388	1.18372	1.15277	1.089	1.22709	4.604	**	
L	Hexachloroethane	.78769	.79148	.73287	.66970	.63592	1.104	.72353	9.624		
L	Nitrobenzene-d5	.42005	.42461	.41358	.39813	.39869	.885	.40941	3.538		
C410	Nitrobenzene	.40934	.39598	.38388	.35749	.34512	.888	.37836	7.044		
C415	Isophorone	.81843	.80638	.79424	.77914	.78785	.927	.79719	1.939		
C420	2-Nitrophenol	.21338	.22372	.23434	.22908	.22600	.939	.22538	3.447	*	
C425	2,4-Dimethylphenol	.36435	.36759	.36125	.35104	.35118	.945	.35987	2.127		
C430	Benzoic acid	-	.15226	.21571	.23386	.21222	.968	.20351	17.423		
C435	bis(2-Chloroethoxy)metha	.52502	.50581	.48486	.45838	.45282	.968	.48498	6.356		
C440	2,4-Dichlorophenol	.30737	.32288	.32348	.31285	.30874	.978	.31506	2.438	*	
C445	1,2,4-Trichlorobenzene	.36212	.35868	.34828	.32752	.31508	.993	.34872	5.578		
C450	Naphthalene	1.14199	1.18428	1.08772	.92685	.88945	1.004	1.01486	18.766		
C455	4-Chloroaniline	.43865	.44716	.43674	.41452	.40538	1.012	.42689	3.951		
C460	Hexachlorobutadiene	.28378	.28688	.19853	.18178	.16959	1.034	.19128	8.583	*	
C465	4-Chloro-3-methylphenol	.37988	.37641	.33576	.32412	.31697	1.091	.33867	2.934	*	
C470	2-Methylnaphthalene	.81642	.59347	.55186	.51915	.49988	1.117	.55598	8.889		
C525	2-Fluorobiphenyl	1.34276	1.25858	1.16972	1.06114	.98639	.912	1.15611	11.561		
C555	2,4,6-Tribromophenol	.25926	.27923	.30872	.29476	.27944	1.101	.28428	6.538		

RF - Response Factor (Subscript is amount in  $\mu\text{g/mL}$ )

RRT - Average Relative Retention Time (RT Std/RT Istd)

RF - Average Response Factor

- Percent Relative Standard Deviation

CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Initial Calibration Data  
HSL Compounds

No: \_\_\_\_\_ Instrument ID: GC/MS D  
Factor: ECOVA Calibration Date: 10/09/89  
Contract No: \_\_\_\_\_

Minimum RF for SPCC is 0.05 Maximum % RSD for CCC is 30.0%

Laboratory ID: >BF496 >BF495 >BF497 >BF498 >BF499		RF	RF	RF	RF	RF	RRT	RF	% RSD	CCC	SPCC
Compound		20.00	50.00	80.00	120.00	160.00					
C510	Hexachlorocyclopentadien	.37366	.40457	.38865	.36650	.34554	.893	.37579	5.949		**
C515	2,4,6-Trichlorophenol	.36939	.38903	.38257	.37376	.37157	.902	.37726	2.191	*	
C520	2,4,5-Trichlorophenol	-	.41037	.40194	.39067	.33346	.907	.38411	9.038		
C525	2-Chloronaphthalene	1.13949	1.11349	1.05047	.96261	.91838	.926	1.03689	9.167		
C530	2-Nitroaniline	-	.36872	.36593	.35370	.35311	.940	.36036	2.253		
C535	Dimethylphthalate	1.38689	1.40916	1.39107	1.31829	1.26555	.967	1.35419	4.461		
C540	Acenaphthylene	2.02009	1.93463	1.85151	1.71410	1.61950	.980	1.82797	8.875		
C545	3-Nitroaniline	-	.23698	.35358	.35160	.34974	.993	.32295	17.771		
C550	Acenaphthene	1.28043	1.22160	1.12436	1.01550	.94877	1.004	1.11813	12.352	*	
C555	2,4-Dinitrophenol	-	.13125	.15657	.16152	.16241	1.006	.15294	9.681		**
C560	4-Nitrophenol	-	.13514	.14979	.15258	.14979	1.013	.14683	5.382		**
C565	Dibenzofuran	1.59843	1.54776	1.43512	1.33354	1.22925	1.025	1.42882	10.606		
	2,4-Dinitrotoluene	.38889	.42298	.41308	.37848	.36245	1.025	.39314	6.388		
	2,6-Dinitrotoluene	.31807	.33537	.35739	.34128	.33421	.975	.33726	4.208		
	Diethylphthalate	1.50050	1.49542	1.49747	1.39150	1.33999	1.058	1.44498	5.163		
C585	4-Chlorophenyl-phenyleth	.67737	.66096	.59417	.52797	.48096	1.067	.58828	14.325		
C590	Fluorene	1.38197	1.34764	1.18728	1.03899	.94323	1.069	1.17981	16.132		
C595	4-Nitroaniline	-	.23849	.30698	.31080	.30288	1.073	.28955	11.799		
C610	4,6-Dinitro-2-methylphen	-	.14089	.16491	.16198	.15888	.907	.15643	6.862		
C615	N-Nitrosodiphenylamine	.49291	.49689	.47517	.44437	.41258	.918	.46422	7.631	*	
C625	4-Bromophenyl-phenylether	.23459	.23314	.22277	.21185	.20063	.958	.22059	6.543		
C630	Hexachlorobenzene	.31465	.29428	.29274	.26967	.25718	.968	.28569	7.897		
C635	Pentachlorophenol	-	.17724	.18396	.17838	.18212	.985	.18048	1.753	*	
C640	Phenanthrene	1.09778	1.08942	1.08815	.92245	.90838	1.003	1.00528	8.884		
C645	Anthracene	1.09686	1.10835	1.01687	.91945	.84269	1.088	.99524	11.338		
C650	Di-n-butylphthalate	1.42918	1.44876	1.31642	1.18145	1.12628	1.064	1.29896	18.978		
C655	Fluoranthene	1.17889	1.28983	1.11829	1.00898	.97418	1.133	1.09769	9.382	*	
C630	Terphenyl-d14	1.28978	1.28982	1.35717	1.35546	1.35884	.904	1.32611	3.248		
C715	Pyrene	1.77536	1.87693	1.92836	1.92378	1.97386	.893	1.89524	4.025		
C720	Butylbenzylphthalate	1.77461	.88843	.90293	.89824	.91387	.945	.87562	6.533		

RF - Response Factor (Subscript is amount in  $\mu\text{g/mL}$ )

RRT - Average Relative Retention Time (RT Std/RT Istd)

RF - Average Response Factor

- Percent Relative Standard Deviation

CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Initial Calibration Data  
HSL Compounds

Instrument ID: GC/MS D  
Factor: ECOVA  
Calibration Date: 10/09/89  
Contract No:

Minimum RF for SPCC is 0.05      Maximum % RSD for CCC is 30.0

Laboratory ID: >BF496 >BF495 >BF497 >BF498 >BF499		RF	RF	RF	RF	RF	RRT	RF	% RSD	CCC	SPCC
Compound		20.00	50.00	80.00	120.00	160.00					
C725	3,3'-Dichlorobenzidine	.22079	.21663	.31817	.39555	.48755	.993	.32774	35.456		
C730	Benzo(a)anthracene	1.24780	1.43224	1.47543	1.47364	1.47460	.998	1.42074	6.926		
C735	bis(2-Ethylhexyl)phthalate	1.00826	1.10600	1.04792	.99152	.92193	1.000	1.01512	6.722		
C740	Chrysene	1.18438	1.31092	1.34028	1.36890	1.30584	1.003	1.30206	5.413		
C760	Di-n-octylphthalate	1.56262	1.74400	1.78551	1.67380	1.59773	.891	1.67273	5.636	*	
C765	Benzo(b)fluoranthene	1.24883	1.34411	1.53032	1.52280	1.52883	.946	1.43498	9.121		
C770	Benzo(k)fluoranthene	1.17724	1.22387	1.14791	.95629	.96584	.949	1.09423	11.386		
C775	Benzo(a)pyrene	1.09246	1.17875	1.25848	1.19438	1.18731	.992	1.18228	5.014	*	
C780	Indeno(1,2,3-cd)pyrene	1.01461	1.12567	1.27507	1.23814	1.23740	1.208	1.17818	9.102		
C785	Dibenzo(a,h)anthracene	.79223	.88558	.96469	.96148	.96219	1.212	.91322	8.264		
C790	Benzo(q,h,i)perylene	.85572	.94563	1.05765	1.01671	1.02263	1.271	.97967	8.281		

- RF - Response Factor (Subscript is amount in  $\mu\text{g/mL}$ )  
RRT - Average Relative Retention Time (RT Std/RT Istd)  
RF - Average Response Factor  
% - Percent Relative Standard Deviation  
C - Calibration Check Compounds (\*)    SPCC - System Performance Check Compounds (\*\*)

Continuing Calibration Check  
HSL Compounds

No: _____	Calibration Date: 10/10/89
Factor: ECOVA	Time: 08:26
Contract No: _____	Laboratory ID: >BF515
Instrument ID: GC/MS D	Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05      Maximum % Diff for CCC is 25.%

Compound	RF	RF	%Diff	CCC	SPCC
CS50 2-Fluorophenol	1.31389	1.34677	2.50		
CS45 Phenol-d5	1.49644	1.50453	.54		
C315 Phenol	1.81028	1.90375	5.16	*	
C325 bis(2-Chloroethyl)ether	1.57753	1.54023	2.36		
C330 2-Chlorophenol	1.44297	1.47968	2.54		
C335 1,3-Dichlorobenzene	1.46005	1.54139	5.57		
C340 1,4-Dichlorobenzene	1.46406	1.52322	4.04	*	
C345 Benzyl alcohol	.90566	.89876	.76		
C350 1,2-Dichlorobenzene	1.45168	1.51414	4.30		
C355 2-Methylphenol	1.29424	1.24989	3.43		
C360 bis(2chloroisopropyl)eth	2.65454	2.54987	3.94		
C365 4-Methylphenol	1.33313	1.35746	1.83		
N-Nitroso-di-n-propylami	1.22709	1.19636	2.50		**
Hexachloroethane	.72353	.73934	2.18		
Nitrobenzene-d5	.40941	.40958	.02		
C410 Nitrobenzene	.37836	.38423	1.55		
C415 Isophorone	.79719	.72207	9.42		
C420 2-Nitrophenol	.22530	.23298	3.37	*	
C425 2,4-Dimethylphenol	.35907	.35375	1.48		
C430 Benzoic acid	.20351	.19338	4.98		
C435 bis(2-Chloroethoxy)metha	.48498	.48056	.89		
C440 2,4-Dichlorophenol	.31506	.32779	4.04	*	
C445 1,2,4-Trichlorobenzene	.34872	.36027	5.74		
C450 Naphthalene	1.01406	1.06679	5.28		
C455 4-Chloroaniline	.42689	.44716	4.75		
C460 Hexachlorobutadiene	.19128	.20578	7.59	*	
C465 4-Chloro-3-methylphenol	.33067	.32531	1.62	*	
C470 2-Methylnaphthalene	.55598	.61517	10.65		
CS25 2-Fluorobiphenyl	.55611	1.32679	14.73		
CS55 2,4,6-Tribromophenol	.28428	.26572	6.53		
CS10 Hexachlorocyclopentadien	.37579	.48119	6.76		**
CS15 2,4,6-Trichlorophenol	.37726	.41088	8.89	*	

RF - Response Factor from daily standard file at 50.00 UG/mL

RF - Average Response Factor from Initial Calibration Form UI

- % Difference from original average or curve

CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Continuing Calibration Check  
HSL Compounds

No: \_\_\_\_\_ Calibration Date: 10/10/89  
Contractor: ECOVA \_\_\_\_\_ Time: 08:26  
Contract No: \_\_\_\_\_ Laboratory ID: >BF515  
Instrument ID: GC/MS D \_\_\_\_\_ Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05 Maximum % Diff for CCC is 25.%

Compound	RF	RF	%Diff	CCC	SPCC
C520 2,4,5-Trichlorophenol	.38411	.43988	14.52		
C525 2-Chloronaphthalene	1.03689	1.13430	9.39		
C530 2-Nitroaniline	.36036	.36067	.09		
C535 Dimethylphthalate	1.35419	1.38432	2.23		
C540 Acenaphthylene	1.82797	2.04699	11.98		
C545 3-Nitroaniline	.32295	.36020	11.53		
C550 Acenaphthene	1.11813	1.23989	10.89	*	
C555 2,4-Dinitrophenol	.15294	.16238	6.17		**
C560 4-Nitrophenol	.14683	.14381	2.05		**
C565 Dibenzofuran	1.42882	1.59225	11.44		
C570 2,4-Dinitrotoluene	.39314	.41490	5.53		
C543 2,6-Dinitrotoluene	.33726	.34265	1.60		
Diethylphthalate	1.44498	1.47618	2.16		
C 4-Chlorophenyl-phenyleth	.58828	.65345	11.08		
C Fluorene	1.17981	1.29367	9.65		
C595 4-Nitroaniline	.28955	.33510	15.73		
C610 4,6-Dinitro-2-methylphen	.15643	.14715	5.93		
C615 N-Nitrosodiphenylamine	.46422	.50401	8.57	*	
C625 4-Bromophenyl-phenylether	.22059	.23113	4.77		
C630 Hexachlorobenzene	.28569	.28854	1.00		
C635 Pentachlorophenol	.18040	.15933	11.68	*	
C640 Phenanthrene	1.00528	1.07526	6.97		
C645 Anthracene	.99524	1.06883	7.39		
C650 Di-n-butylphthalate	1.29896	1.32264	1.82		
C655 Fluoranthene	1.89769	1.14282	4.11	*	
C630 Terphenyl-d14	1.32611	1.34282	1.58		
C715 Pyrene	1.39984	1.87682	.97		
C720 Butylbenzylphthalate	1.87462	.83631	4.49		
C725 3,3'-Dichlorobenzidine	1.72774	.54854	67.37		
C730 Benzo(a)anthracene	1.42874	1.42451	.26		
C735 bis(2-Ethylhexyl)phthalate	1.81512	1.82753	1.22		
C740 Chrysene	1.38286	1.34556	3.34		

RF - Response Factor from daily standard file at 50.00 UG/mL

RF - Average Response Factor from Initial Calibration Form VI

- % Difference from original average or curve

CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Continuing Calibration Check  
HSL Compounds

No: \_\_\_\_\_ Calibration Date: 10/10/89  
 Contractor: ECOVA \_\_\_\_\_ Time: 08:26  
 Contract No: \_\_\_\_\_ Laboratory ID: >BF515  
 Instrument ID: GC/MS D \_\_\_\_\_ Initial Calibration Date: 10/09/89

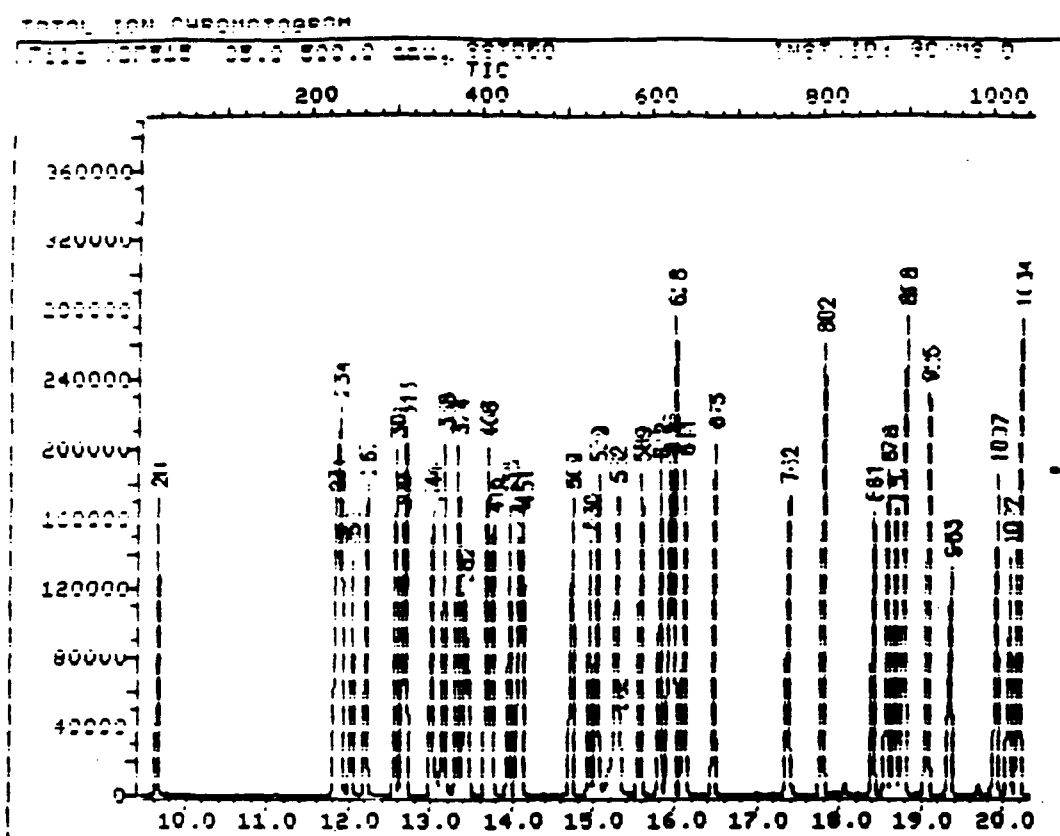
Minimum  $\overline{RF}$  for SPCC is 0.05 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
C760 Di-n-octylphthalate	1.67273	1.69816	1.52	*	
C765 Benzo(b)fluoranthene	1.43498	1.44988	1.04		
C770 Benzo(k)fluoranthene	1.09423	1.14627	4.76		
C775 Benzo(a)pyrene	1.18228	1.21397	2.68	*	
C780 Indeno(1,2,3-cd)pyrene	1.17818	1.26094	7.02		
C785 Dibenzo(a,h)anthracene	.91322	.99610	9.08		
C790 Benzo(q,h,i)perylene	.97967	1.05029	7.21		



- RF - Response Factor from daily standard file at 50.00  $\mu\text{g/mL}$   
 $\overline{RF}$  - Average Response Factor from Initial Calibration Form VI  
 % - % Difference from original average or curve  
 CCC - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)





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 Misc: INST.ID: GC/MS D

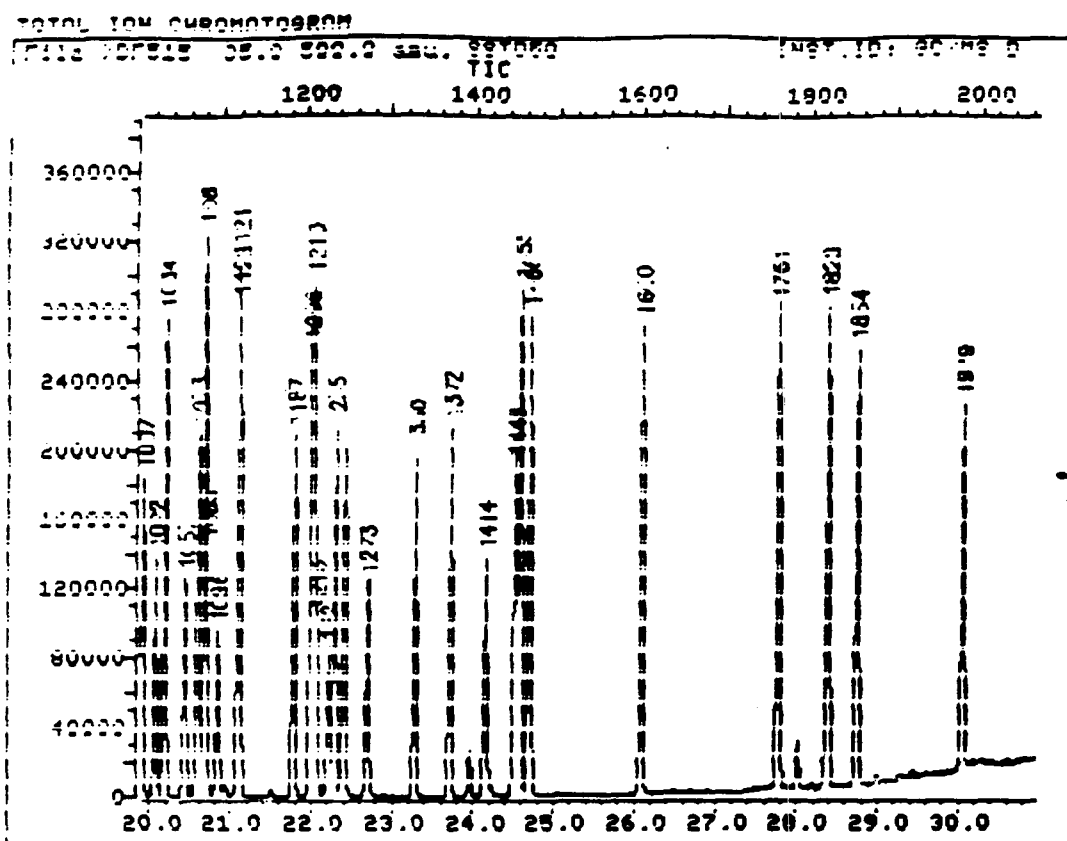
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BT# 1

Id File: ID2EPA::GM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891109 14:16

Operator ID: SHERRI  
 Quant Time: 891010 09:22  
 Injected at: 891010 08:26

TIC page 1 of 1



Data File: >BF515::01  
 Name: SST050  
 Misc: INST.ID: GC/MS 0

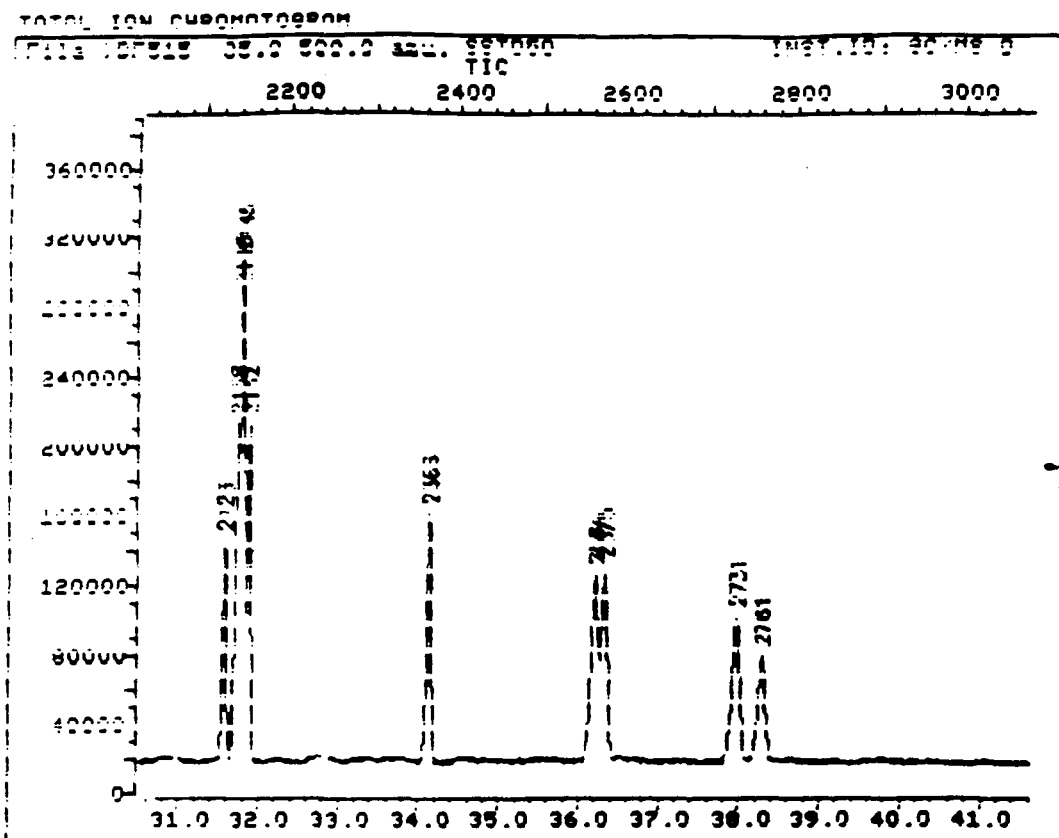
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Id File: ID2EPA::GM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891109 14:16

Operator ID: SHERRI  
 Quant Time: 891010 09:22  
 Injected at: 891010 08:26

TIC page 2



Data File: ^BF515::D1  
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 Misc: INST.ID: GC/MS 0

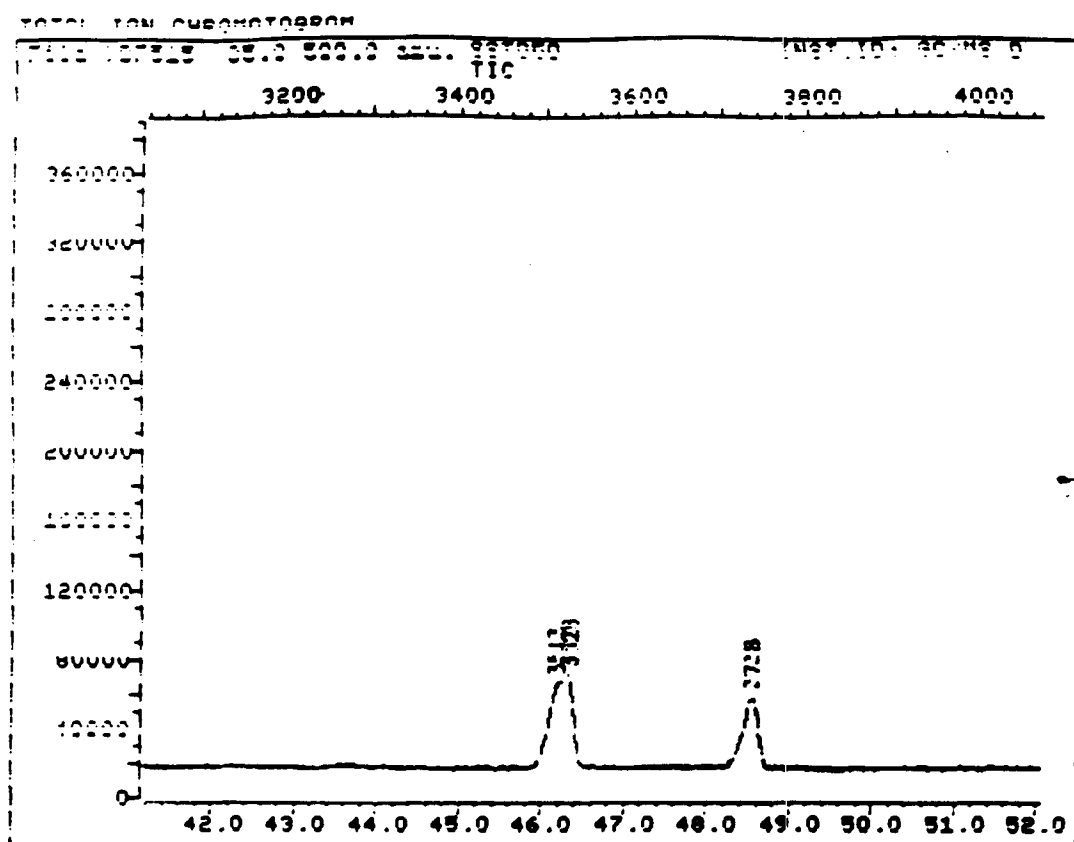
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Run # 1

Id File: ID\FPA::NM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891109 14:16

Operator ID: SHERRI  
 Quant Time: 891010 09:22  
 Injected at: 891010 08:26

TIC page 3-



Data File: >BF515::D1  
 Name: SST050  
 Misc: INST. ID: GC/MS D

Quant Output File: ^BF515::QT

BTL# 1

Id File: ID2EPA::IRM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891109 14:16

Operator ID: SHERRI  
 Quant Time: 891010 09:22  
 Injected at: 891010 08:26

TIC page 4 of 1

QUANT REPORT

anator ID: SHERRI  
 Output File: ^BF515:QT  
 Data File: ^BF515:D1  
 Name: SSFD50  
 Misc: INST.ID: GDM5 D

Quant Rev: 6 Quant Time: 891010 09:22  
 Injected at: 891010 08:26  
 Dilution Factor: 1.000000

BIL# 1

ID File: IDVEPA:IRM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891009 14:16

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*C130 1,4-Dichlorobenzene-d4	12.65	309	53699	40.00	UG/mL	95
2)	C350 2-Fluorophenol	9.64	20	90400	50.52	UG/mL	83
3)	C345 Phenol-d5	11.84	231	100990	47.94	UG/mL	94
4)	C315 Phenol	11.87	234	122787	48.63	UG/mL	92
5)	C325 bis(2-Chloroethyl)ether	12.03	250	103386	47.34	UG/mL	96
6)	C330 2-Chlorophenol	12.21	267	99322	51.05	UG/mL	89
7)	C335 1,3-Dichlorobenzene	12.57	301	103464	50.51	UG/mL	99
8)	C340 1,4-Dichlorobenzene	12.69	313	102744	49.71	UG/mL	98
9)	C345 Benzyl alcohol	13.01	344	60328	49.58	UG/mL	86
10)	C350 1,2-Dichlorobenzene	13.16	358	101635	49.38	UG/mL	95
11)	C355 2-Methylphenol	13.33	374	83897	46.48	UG/mL	92
12)	C360 bis(2-chloroisopropyl)eth	13.41	382	171157	46.70	UG/mL	95
	C365 4-Methylphenol	13.68	408	91118	48.52	UG/mL	91
	C370 N-Nitroso-di-n-propylami	13.76	416	80304	46.97	UG/mL	91
	C375 Hexachloroethane	13.96	435	49627	48.71	UG/mL	95
16)	*C140 Naphthalene-d8	15.92	623	217485	40.00	UG/mL	85
17)	C320 Nitrobenzene-d5	14.08	446	111326	47.65	UG/mL	91
18)	C410 Nitrobenzene	14.13	451	104456	47.96	UG/mL	96
19)	C415 Isophorone	14.73	509	196300	45.01	UG/mL	94
20)	C420 2-Nitrophenol	14.95	530	63315	49.78	UG/mL	88
21)	C425 2,4-Dimethylphenol	15.04	539	96169	47.69	UG/mL	89
22)	C430 Benzoic acid	15.31	565	52571	47.94	UG/mL	85
23)	C435 bis(2-Chloroethoxy)metha	15.28	562	130644	47.80	UG/mL	91
24)	C440 2,4-Dichlorophenol	15.56	589	89112	49.84	UG/mL	85
25)	C445 1,2,4-Trichlorobenzene	15.80	612	97941	51.28	UG/mL	98
26)	C450 Naphthalene	15.97	628	290013	48.19	UG/mL	91
27)	C455 4-Chloroaniline	16.11	641	121563	49.87	UG/mL	90
28)	C460 Hexachlorocyclopentadiene	16.46	675	56924	51.43	UG/mL	92
29)	C465 4-Chloro-2-methylphenol	17.36	762	88438	45.84	UG/mL	73
30)	C470 2-Methyl-naphthalene	17.78	802	167237	51.22	UG/mL	94
31)	*C150 Acenaphthene-d10	20.60	1073	133938	40.00	UG/mL	94
32)	C325 2-Fluorobiphenyl	18.78	898	222061	53.90	UG/mL	96
33)	C355 2,4,6-Tribromophenol	22.69	1273	44487	42.46	UG/mL	74
34)	C310 Hexachlorocyclopentadien	18.39	861	67168	54.73	UG/mL	95
35)	C315 2,4,6-Trichlorophenol	18.57	878	68778	53.87	UG/mL	90
36)	C320 2,4,5-Trichlorophenol	18.67	887	73645	52.17	UG/mL	95
37)	C325 2-Chloronaphthalene	19.06	925	189908	51.03	UG/mL	91
	C330 2-Nitroaniline	19.35	953	60385	47.60	UG/mL	82
	C335 Dimethylphthalate	19.91	1007	231767	49.59	UG/mL	78
	C340 Acenaphthylene	20.20	1034	342712	52.08	UG/mL	82
41)	C345 3-Nitroaniline	20.44	1057	60306	53.60	UG/mL	76
42)	C350 Acenaphthene	20.69	1081	207586	50.05	UG/mL	96
43)	C355 2,4-Dinitrophenol	20.71	1083	27186	52.24	UG/mL	70

	Compound	R. T.	Scan#	Area	Time	Units	
45)	C560 4-Nitrophenol	20.84	1196	241127	51.16	UG/mL	90
46)	C565 Dibenzofuran	21.10	1121	266578	51.53	UG/mL	91
47)	C570 2,4-Dinitrotoluene	21.11	1122	69463	42.11	UG/mL	88
48)	C543 2,6-Dinitrotoluene	20.07	1022	57368	42.56	UG/mL	75
49)	C580 Diethylphthalate	21.29	1187	242146	48.23	UG/mL	90
50)	C585 4-Chlorophenyl-phenyleth	21.99	1216	109403	48.81	UG/mL	82
51)	C590 Fluorene	22.03	1210	216589	48.24	UG/mL	89
52)	C595 4-Nitroaniline	22.06	1213	56104	62.05	UG/mL	89
53)	*C610 Phenanthrene-d10	24.51	1448	243355	41.111	UG/mL	70
54)	C615 4,6-Dinitro-2-methylphen	22.21	1227	44762	48.26	UG/mL	82
55)	C615 N-Nitrosodiphenylamine	22.29	1235	153317	51.21	UG/mL	90
56)	C625 4-Bromophenyl-phenylether	23.28	1330	70307	51.44	UG/mL	82
57)	C630 Hexachlorobenzene	23.72	1322	82223	48.211	UG/mL	90
58)	C635 Pentachlorophenol	24.15	1414	48468	45.59	UG/mL	93
59)	C640 Phenanthrene	24.58	1455	322116	51.35	UG/mL	92
60)	C645 Anthracene	24.70	1466	325131	51.36	UG/mL	93
61)	C650 Di-n-butylphthalate	26.119	1610	4112339	42.98	UG/mL	83
62)	C655 Fluoranthene	27.77	1761	347640	49.91	UG/mL	98
63)	*C170 Chrysene-d12	31.28	2143	148358	41.100	UG/mL	84
64)	C530 Terphenyl-d14	28.74	1854	249801	51.71	UG/mL	88
65)	C715 Pyrene	28.39	1820	348152	49.40	UG/mL	92
66)	C720 Butylbenzylphthalate	30.05	1979	155091	49.41	UG/mL	89
67)	C725 3,3'-Dichlorobenzidine	31.57	2123	101726	112.26	UG/mL	93
68)	C730 Benzo(a)anthracene	31.73	2138	264171	51.85	UG/mL	88
69)	C735 bis(2-Ethylhexyl)phthalate	31.80	2145	191153	49.45	UG/mL	9
70)	C740 Chrysene	31.88	2152	249531	51.38	UG/mL	85
71)	*C175 Perylene-d12	38.29	2261	144246	41.110	UG/mL	91
72)	C760 Di-n-octylphthalate	34.13	2366	307253	49.47	UG/mL	82
73)	C765 Benzo(b)fluoranthene	36.21	2564	262330	52.41	UG/mL	94
74)	C770 Benzo(k)fluoranthene	36.33	2575	207397	44.54	UG/mL	95
75)	C775 Benzo(a)pyrene	37.97	2731	219647	50.72	UG/mL	94
76)	C780 Indeno(1,2,3-cd)pyrene	46.19	3513	228145	55.55	UG/mL	92
77)	C785 Dibenzo(a,h)anthracene	46.35	3528	180227	55.57	UG/mL	93
78)	C790 Benzo(g,h,i)perylene	48.55	3738	190032	56.18	UG/mL	93

\* Compound is ISTD



Continuing Calibration Check  
HSL Compounds

Factor: ECDUA	Calibration Date: 10/11/89
Contract No:	Time: 08:27
Instrument ID: GC/MS D	Laboratory ID: >BF538
	Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05      Maximum % Diff for CCC is 25.%

Compound	RF	RF	%Diff	CCC	SPCC
C550 2-Fluorophenol	1.31389	1.32001	.47		
C545 Phenol-d5	1.49644	1.44299	3.57		
C315 Phenol	1.81028	1.75966	2.80 *		
C325 bis(2-Chloroethyl)ether	1.57753	1.47045	6.79		
C330 2-Chlorophenol	1.44297	1.38217	4.21		
C335 1,3-Dichlorobenzene	1.46005	1.55314	6.38		
C340 1,4-Dichlorobenzene	1.46406	1.52364	4.07 *		
C345 Benzyl alcohol	.90566	.85014	6.13		
C350 1,2-Dichlorobenzene	1.45168	1.48032	1.97		
C355 2-Methylphenol	1.29424	1.21933	5.79		
C360 bis(2chloroisopropyl)eth	2.65454	2.58753	2.52		
C365 4-Methylphenol	1.33313	1.27973	4.01		
C Nitroso-di-n-propylam	1.22709	1.13836	7.23	**	
C xachloroethane	.72353	.72231	.17		
Nitrobenzene-d5	.40941	.41803	2.11		
C410 Nitrobenzene	.37836	.39406	4.15		
C415 Isophorone	.79719	.74861	6.09		
C420 2-Nitrophenol	.22530	.23438	4.03 *		
C425 2,4-Dimethylphenol	.35907	.35722	.52		
C430 Benzoic acid	.20351	.17097	15.99		
C435 bis(2-Chloroethoxy)metha	.48490	.47368	2.31		
C440 2,4-Dichlorophenol	.31506	.33428	6.07 *		
C445 1,2,4-Trichlorobenzene	.34072	.37226	9.26		
C450 Naphthalene	1.01406	1.06135	4.66		
C455 4-Chloroaniline	.42689	.44149	3.42		
C460 Hexachlorobutadiene	.19128	.22814	15.14 *		
C465 4-Chloro-3-methylphenol	.33867	.33844	2.36 *		
C470 2-Methylnaphthalene	.55598	.61455	10.53		
C525 2-Fluorobiphenyl	1.15611	1.27125	9.96		
C555 2,4,6-Tribromophenol	.28428	.24422	14.09		
C510 Hexachlorocyclopentadiene	.37579	.37597	.05	**	
C515 2,4,6-Trichlorophenol	.37726	.40477	7.29 *		

RF - Response Factor from daily standard file at 50.00 ug/mL

RF - Average Response Factor from Initial Calibration Form UI

% - % Difference from original average or curve

C - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

Continuing Calibration Check  
HSL Compounds

No: \_\_\_\_\_ Calibration Date: 10/11/89  
Factor: ECOVA \_\_\_\_\_ Time: 08:27  
Contract No: \_\_\_\_\_ Laboratory ID: >BF538  
Instrument ID: GC/MS D \_\_\_\_\_ Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05 Maximum % Diff for CCC is 25.%

Compound	RF	RF	%Diff	CCC	SPCC
C520 2,4,5-Trichlorophenol	.38411	.43786	13.99		
C525 2-Chloronaphthalene	1.03689	1.12543	8.54		
C530 2-Nitroaniline	.36036	.36669	1.76		
C535 Dimethylphthalate	1.35419	1.41313	4.35		
C540 Acenaphthylene	1.82797	1.99081	8.91		
C545 3-Nitroaniline	.32295	.37216	15.24		
C550 Acenaphthene	1.11813	1.22826	9.85	*	
C555 2,4-Dinitrophenol	.15294	.15830	3.51		**
C560 4-Nitrophenol	.14683	.14804	.82		**
C565 Dibenzofuran	1.42882	1.56774	9.72		
C570 2,4-Dinitrotoluene	.39314	.43998	11.91		
C543 2,6-Dinitrotoluene	.33726	.35319	4.72		
Diethylphthalate	1.44498	1.55870	7.87		
4-Chlorophenyl-phenyleth	.58828	.63869	8.57		
Fluorene	1.17981	1.28045	8.53		
C595 4-Nitroaniline	.28955	.35406	22.28		
C610 4,6-Dinitro-2-methylphen	.15643	.15436	1.32		
C615 N-Nitrosodiphenylamine	.46422	.50057	7.83	*	
C625 4-Bromophenyl-phenylether	.22059	.22723	3.01		
C630 Hexachlorobenzene	.28569	.26857	5.99		
C635 Pentachlorophenol	.18040	.15649	13.26	*	
C640 Phenanthrene	1.00520	1.08187	7.55		
C645 Anthracene	.99524	1.09512	10.04		
C650 Di-n-butylphthalate	1.29896	1.39715	7.56		
C655 Fluoranthene	1.09769	1.19597	8.95	*	
C530 Terphenyl-d14	1.32611	1.38119	1.88		
C715 Pyrene	1.89924	1.84838	2.89		
C720 Butylbenzylphthalate	1.87548	1.88696	1.29		
C725 3,3'-Dichlorobenzidine	1.38774	1.34946	6.63		
C730 Benzo(a)anthracene	1.42174	1.41365	.50		
C735 bis(2-Ethylhexyl)phthalate	1.81512	1.89968	8.32		
C740 Chrysene	1.38286	1.34327	3.16		

RF - Response Factor from daily standard file at 50.00 ug/mL

RF - Average Response Factor from Initial Calibration Form VI

- % Difference from original average or curve

- Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)



Continuing Calibration Check  
HSL Compounds

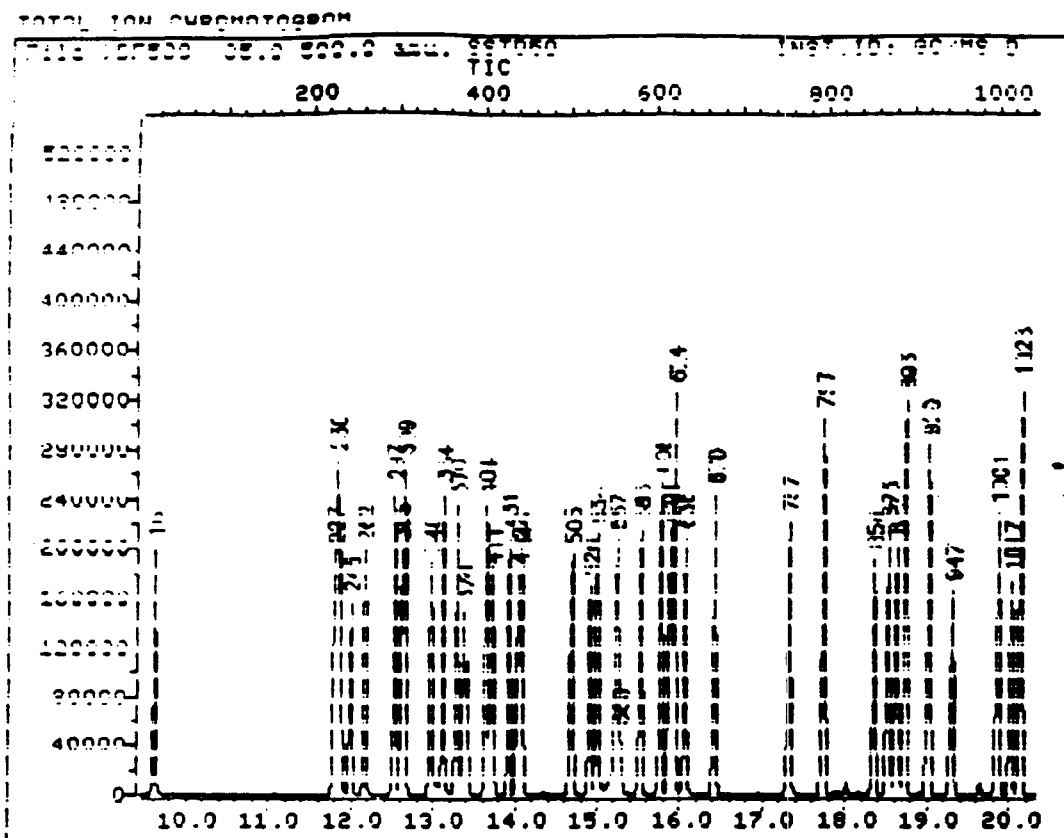
Lab: _____	Calibration Date: 10/11/89
Factor: ECDVA	Time: 08:27
Contract No: _____	Laboratory ID: 08F538
Instrument ID: GC/MS D	Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05      Maximum % Diff for CCC is 25.0%

Compound	RF	RF	%Diff	CCC	SPCC
C760 Di-n-octylphthalate	1.67273	1.99722	19.40	*	
C765 Benzo(b)fluoranthene	1.43498	1.67229	16.54		
C770 Benzo(k)fluoranthene	1.09423	1.20303	9.94		
C775 Benzo(a)pyrene	1.18228	1.27820	8.11	*	
C780 Indeno(1,2,3-cd)pyrene	1.17818	1.21232	2.90		
C785 Dibenzo(a,h)anthracene	.91322	.94861	3.88		
C790 Benzo(q,h,i)perylene	.97967	.99271	1.33		



- RF - Response Factor from daily standard file at 50.00 UG/mL
- RF - Average Response Factor from Initial Calibration Form VI
- % - % Difference from original average or curve
- Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)



Data File: >BF538::D2  
Name: SST050  
Misc: INST.ID: GC/MS D

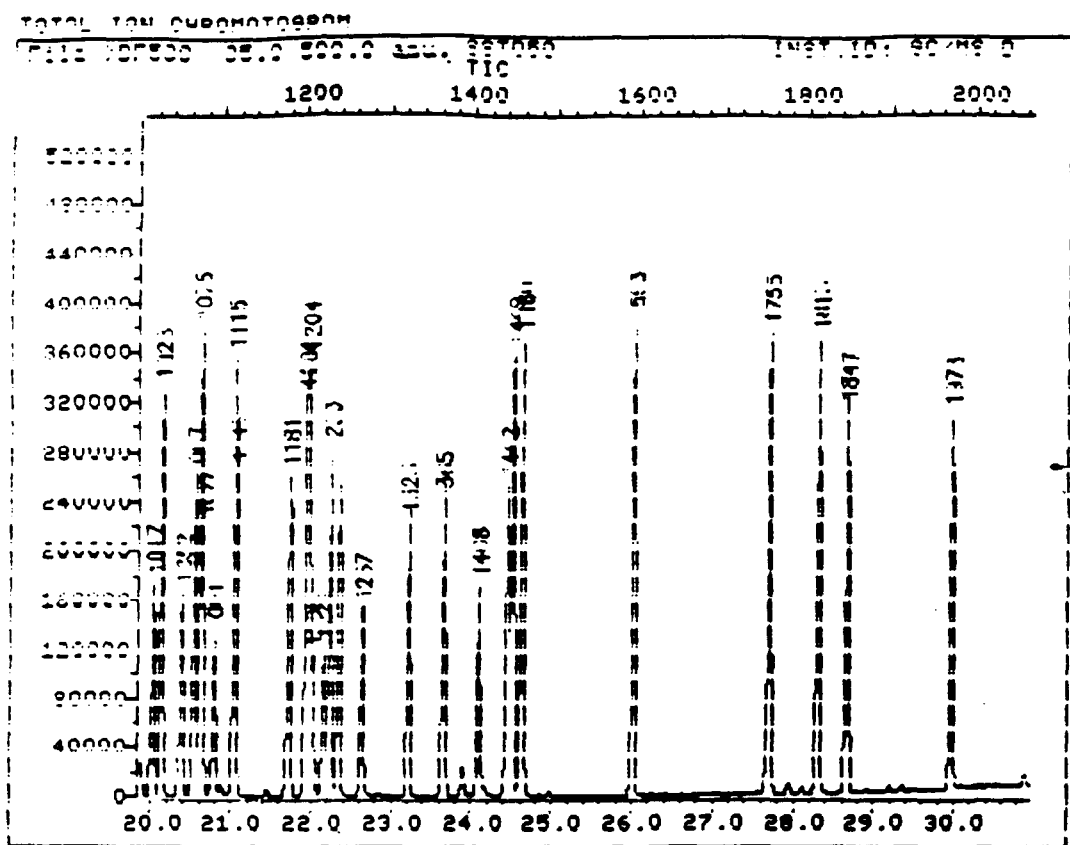
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BFL# 1

Id File: IDZEPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: DENNIS  
Quant Time: 891011 09:22  
Injected at: 891011 08:27

TIC page 1 of 4



Data File: >8F538::D2 Quant Output File: ^8F538::QT

Name: SST050

Misc: INST.ID: GC/MS D BTL# 1

Id File: ID2EPA::GM

Title: DAILY CALIBRATION STANDARD

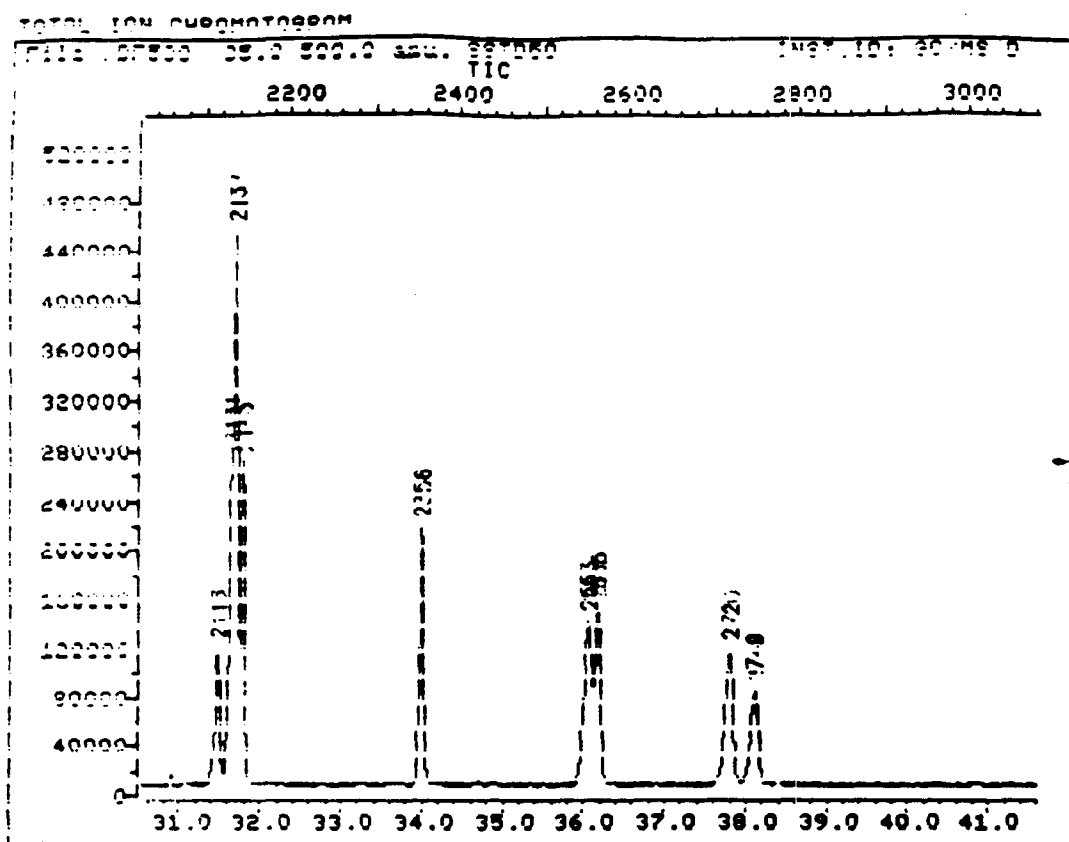
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Operator ID: DENNIS

Quant Time: 891011 09:22

Injected at: 891011 08:27

TIC page 2 of 4



Data File: >8F538::D2  
 Name: SST050  
 Misc: INST.ID: GC/MS D

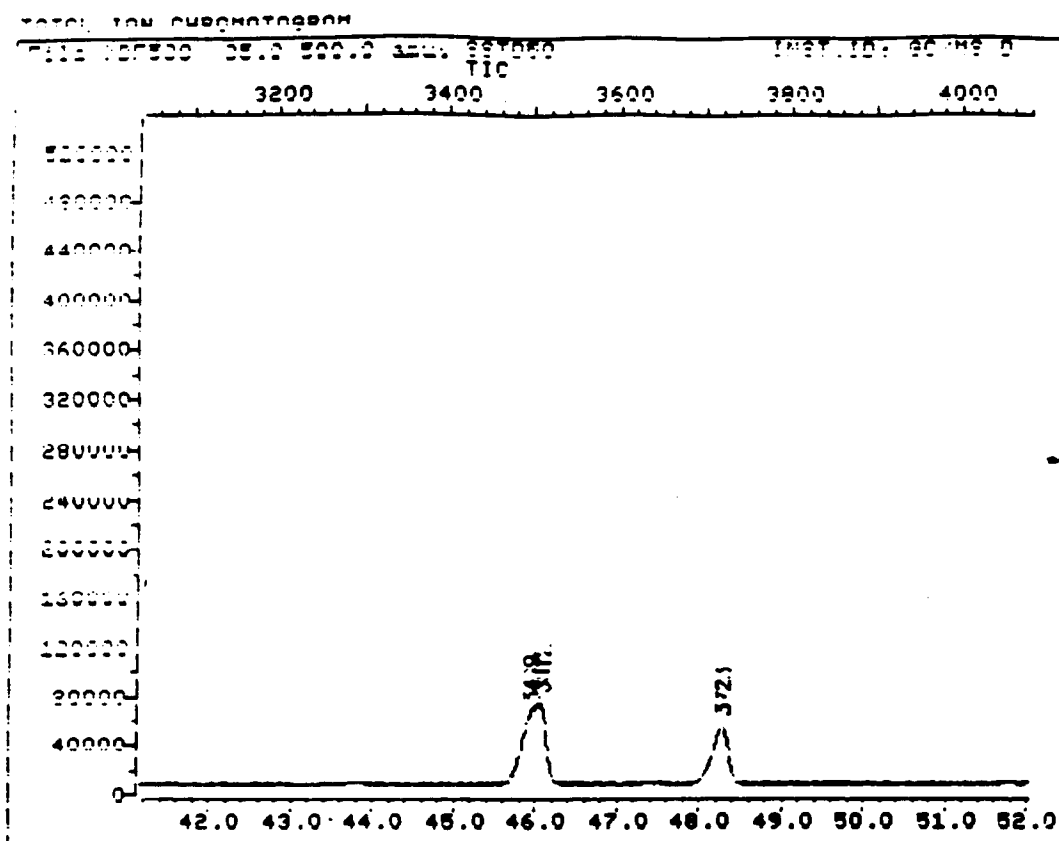
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BTL# 1

Id File: ID2EPA::GM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891010 09:42

Operator ID: DENNIS  
 Quant Time: 891011 09:22  
 Injected at: 891011 08:27

TIC page 3 of 4



Data File: >BF538::D2  
Name: SST050  
Misc: INST.ID: GC/MS D

Quant Output File: ^BF538::QT

BTL# 1

Id File: ID2EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: DENNIS  
Quant Time: 891011 09:22  
Injected at: 891011 08:27

TIC page 4 of 4

QUANT REPORT

Operator ID: DENNIS  
 Output File: ABF538::QT  
 Data File: ABF538::D2  
 Name: S40050  
 Misc: INST.ID: GC/MS D

Quant Rev: 6 Quant Time: 891011 09:22  
 Injected at: 891011 08:27  
 Dilution Factor: 1.000000

RIL# 1

ID File: ID2EPA::ISM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891010 09:42

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*C130 1,4-Dichlorobenzene-d4	12.61	305	66277	40.00	UG/mL	94
2)	C550 2-Fluorophenol	9.61	16	109558	49.01	UG/mL	81
3)	C545 Phenol-d5	11.80	227	119546	47.95	UG/mL	94
4)	C515 Phenol	11.83	230	145781	46.22	UG/mL	94
5)	C325 bis(2-Chloroethyl)ether	12.00	246	121821	47.73	UG/mL	96
6)	C330 2-Chlorophenol	12.17	262	114508	46.71	UG/mL	90
7)	C335 1,3-Dichlorobenzene	12.53	297	128672	50.38	UG/mL	98
8)	C340 1,4-Dichlorobenzene	12.66	309	126228	50.01	UG/mL	99
9)	C345 Benzyl alcohol	12.98	340	70431	47.30	UG/mL	86
10)	C350 1,2-Dichlorobenzene	13.12	354	122659	48.88	UG/mL	97
11)	C355 2-Methylphenol	13.29	370	101017	48.78	UG/mL	96
12)	C360 bis(2chloroisopropyl)eth	13.37	378	214567	50.74	UG/mL	97
13)	C365 4-Methylphenol	13.64	404	106021	47.14	UG/mL	97
14)	C370 N-Nitroso-di-n-propylami	13.72	411	94509	47.58	UG/mL	88
15)	C375 Hexachloroethane	13.93	431	59841	48.85	UG/mL	95
16)	*C140 Naphthalene-d8	15.87	618	255562	40.00	UG/mL	84
17)	C520 Nitrobenzene-d5	14.04	442	133437	51.04	UG/mL	91
18)	C410 Nitrobenzene	14.08	446	125786	51.28	UG/mL	97
19)	C415 Isophorone	14.69	505	238958	51.84	UG/mL	93
20)	C420 2-Nitrophenol	14.91	526	74816	50.32	UG/mL	93
21)	C425 2,4-Dimethylphenol	15.00	534	114025	50.49	UG/mL	91
22)	C430 Benzoic acid	15.27	560	54575	44.21	UG/mL	92
23)	C435 bis(2-Chloroethoxy)metha	15.24	557	151200	49.28	UG/mL	95
24)	C440 2,4-Dichlorophenol	15.53	585	106678	50.98	UG/mL	81
25)	C445 1,2,4-Trichlorobenzene	15.77	608	118825	51.66	UG/mL	98
26)	C450 Naphthalene	15.93	624	338786	49.75	UG/mL	92
27)	C455 4-Chloroaniline	16.06	636	140925	49.37	UG/mL	89
28)	C460 Hexachlorobutadiene	16.41	670	70269	53.51	UG/mL	93
29)	C465 4-Chloro-3-methylphenol	17.32	757	108038	52.02	UG/mL	74
30)	C470 2-Methylnaphthalene	17.73	797	196166	49.95	UG/mL	94
31)	*C150 Acenaphthene-d10	20.55	1067	165494	40.00	UG/mL	98
32)	C525 2-Fluorobiphenyl	18.73	893	262980	47.92	UG/mL	93
33)	C555 2,4,6-Tribromophenol	22.63	1267	50522	45.96	UG/mL	71
34)	C510 Hexachlorocyclopentadien	18.35	856	77777	46.86	UG/mL	96
35)	C515 2,4,6-Trichlorophenol	18.52	873	83734	49.27	UG/mL	96
36)	C520 2,4,5-Trichlorophenol	18.62	882	90579	49.77	UG/mL	92
37)	C525 2-Chloronaphthalene	19.02	920	232814	49.61	UG/mL	92
38)	C530 2-Nitroaniline	19.30	947	75857	50.83	UG/mL	82
39)	C535 Dimethylphthalate	19.86	1001	292331	51.04	UG/mL	76
40)	C540 Acenaphthylene	20.14	1028	411833	48.63	UG/mL	87
41)	C545 3-Nitroaniline	20.39	1052	76988	51.66	UG/mL	75
42)	C550 Acenaphthene	20.63	1075	254088	49.53	UG/mL	97
43)	C555 2,4-Dinitrophenol	20.65	1077	32747	48.74	UG/mL	71

	Compound	R. f.	Scan#	Area	Conc	Units	a
	C560 4-Nitrophenol	20.80	1191	30624	51.42	UG/mL	88
45)	C565 Dibenzofuran	21.05	1115	324314	49.23	UG/mL	91
46)	C570 2,4-Dinitrotoluene	21.07	1117	91118	53.02	UG/mL	74
47)	C543 2,6-Dinitrotoluene	20.02	1017	73064	51.54	UG/mL	78
48)	C580 Diethylphthalate	21.23	1181	322444	52.29	UG/mL	92
49)	C585 4-Chlorophenyl-phenyleth	21.93	1200	132124	48.87	UG/mL	84
50)	C590 Fluorene	21.97	1204	264884	49.49	UG/mL	99
51)	C595 4-Nitroaniline	22.01	1208	73244	52.83	UG/mL	90
52)	*C160 Phenanthrene-d10	24.45	1442	310312	40.00	UG/mL	81
53)	C610 4,6-Dinitro-2-methylphen	22.16	1222	59874	52.45	UG/mL	82
54)	C615 N-Nitrosodiphenylamine	22.24	1230	194167	49.66	UG/mL	91
55)	C625 4-Bromophenyl-phenylether	23.21	1323	88140	49.16	UG/mL	81
56)	C630 Hexachlorobenzene	23.65	1365	104176	46.54	UG/mL	92
57)	C635 Pentachlorophenol	24.10	1408	60701	49.11	UG/mL	96
58)	C640 Phenanthrene	24.52	1449	419337	50.27	UG/mL	92
59)	C645 Anthracene	24.64	1460	424785	51.23	UG/mL	93
60)	C650 Di-n-butylphthalate	26.02	1593	541442	52.82	UG/mL	82
61)	C655 Fluoranthene	27.71	1755	463904	52.33	UG/mL	92
62)	*C170 Chrysene-d12	31.70	2137	205160	40.00	UG/mL	91
63)	C530 Terphenyl-d14	28.67	1847	333691	48.30	UG/mL	88
64)	C715 Pyrene	28.31	1813	471965	49.03	UG/mL	91
65)	C720 Butylbenzylphthalate	29.98	1973	227446	53.02	UG/mL	84
66)	C725 3,3'-Dichlorobenzidine	31.48	2116	89620	31.85	UG/mL	95
67)	C730 Benzo(a)anthracene	31.63	2131	362530	49.62	UG/mL	82
	C735 bis(2-Ethylhexyl)phthala	31.70	2137	281493	53.51	UG/mL	93
	C740 Chrysene	31.78	2145	344482	49.91	UG/mL	86
	*C175 Perylene-d12	38.10	2749	173536	40.00	UG/mL	91
71)	C760 Di-n-octylphthalate	33.99	2356	433237	58.81	UG/mL	85
72)	C765 Benzo(b)fluoranthene	36.05	2553	362754	52.67	UG/mL	92
73)	C770 Benzo(k)fluoranthene	36.18	2565	260961	52.48	UG/mL	95
74)	C775 Benzo(a)pyrene	37.80	2720	277268	52.65	UG/mL	94
75)	C780 Indeno(1,2,3-cd)pyrene	45.94	3499	262977	48.07	UG/mL	92
76)	C785 Dibenzo(a,h)anthracene	46.08	3512	205772	47.62	UG/mL	93
77)	C790 Benzo(g,h,i)perylene	48.28	3723	215339	47.26	UG/mL	91

\* Compound is ISTD

Continuing Calibration Check  
HSL Compounds

No: \_\_\_\_\_ Calibration Date: 10/12/89  
Factor: ECDVA \_\_\_\_\_ Time: 07:31  
Contract No: \_\_\_\_\_ Laboratory ID: >BF550  
Instrument ID: GC/MS D \_\_\_\_\_ Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05 Maximum % Diff for CCC is 25.0%

Compound	RF	RF	%Diff	CCC	SPCC
C350 2-Fluorophenol	1.31389	1.39134	5.90		
C345 Phenol-d5	1.49644	1.51388	1.17		
C315 Phenol	1.81028	1.97412	9.05	*	
C325 bis(2-Chloroethyl)ether	1.57753	1.57252	.32		
C330 2-Chlorophenol	1.44297	1.44033	.18		
C335 1,3-Dichlorobenzene	1.46005	1.59138	8.99		
C340 1,4-Dichlorobenzene	1.46406	1.62206	10.79	*	
C345 Benzyl alcohol	.90566	.87389	3.51		
C350 1,2-Dichlorobenzene	1.45168	1.53865	5.99		
C355 2-Methylphenol	1.29424	1.27898	1.18		
C360 bis(2chloroisopropyl)eth	2.65454	2.78303	4.84		
C365 4-Methylphenol	1.33313	1.26276	5.28		
C N-Nitroso-di-n-propylam	1.22709	1.15741	5.68	**	
C Hexachloroethane	.72353	.76112	5.20		
C Nitrobenzene-d5	.40941	.43284	5.72		
C410 Nitrobenzene	.37836	.41364	9.33		
C415 Isophorone	.79719	.74663	6.34		
C420 2-Nitrophenol	.22530	.23275	3.31	*	
C425 2,4-Dimethylphenol	.35907	.36342	1.21		
C430 Benzoic acid	.20351	.20991	3.14		
C435 bis(2-Chloroethoxy)metha	.48490	.49479	2.04		
C440 2,4-Dichlorophenol	.31506	.32082	1.83	*	
C445 1,2,4-Trichlorobenzene	.34072	.36491	7.10		
C450 Naphthalene	1.01486	1.18629	9.89		
C455 4-Chloroaniline	.42689	.44462	4.15		
C460 Hexachlorobutadiene	.19128	.20779	8.78	*	
C465 4-Chloro-3-methylphenol	.33867	.31463	4.85	*	
C470 2-Methylnaphthalene	.59598	.59312	6.68		
C525 2-Fluorobiphenyl	1.15611	1.34462	16.31		
C555 2,4,6-Tribromophenol	.28882	.21843	25.98		
C510 Hexachlorocyclopentadien	.37577	.45969	22.33	**	
C515 2,4,6-Trichlorophenol	.37726	.40228	6.61	*	

RF - Response Factor from daily standard file at 50.00 ug/mL

RF - Average Response Factor from Initial Calibration Form VI

% - % Difference from original average or curve

C - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)



Continuing Calibration Check  
HSL Compounds

Contract No: \_\_\_\_\_

Instrument ID: GC/MS D \_\_\_\_\_

Calibration Date: 10/12/89 \_\_\_\_\_

Time: 07:31 \_\_\_\_\_

Laboratory ID: >BF550 \_\_\_\_\_

Initial Calibration Date: 10/09/89 \_\_\_\_\_

Minimum RF for SPCC is 0.05      Maximum % Diff for CCC is 25.%

Compound	RF	RF	%Diff	CCC SPCC
C520 2,4,5-Trichlorophenol	.38411	.42160	9.76	
C525 2-Chloronaphthalene	1.03689	1.16456	12.31	
C530 2-Nitroaniline	.36036	.36681	1.79	
C535 Dimethylphthalate	1.35419	1.34574	.62	
C540 Acenaphthylene	1.82797	2.03156	11.14	
C545 3-Nitroaniline	.32295	.34341	6.33	
C550 Acenaphthene	1.11813	1.25753	12.47	*
C555 2,4-Dinitrophenol	.15294	.16487	7.80	**
C560 4-Nitrophenol	.14683	.12783	12.94	**
C565 Dibenzofuran	1.42882	1.59068	11.33	
C570 2,4-Dinitrotoluene	.39314	.40507	3.03	
C543 2,6-Dinitrotoluene	.33726	.33598	.40	
Diethylphthalate	1.44498	1.42971	1.06	
C Chlorophenyl-phenyleth	.58828	.63589	8.09	
Fluorene	1.17981	1.33509	13.16	
C575 4-Nitroaniline	.28955	.33022	14.05	
C610 4,6-Dinitro-2-methylphen	.15643	.15547	.61	
C615 N-Nitrosodiphenylamine	.46422	.51184	10.26	*
C625 4-Bromophenyl-phenylether	.22059	.22842	3.55	
C630 Hexachlorobenzene	.28569	.25556	10.54	
C635 Pentachlorophenol	.18048	.14828	17.81	*
C640 Phenanthrene	1.00528	1.10448	9.87	
C645 Anthracene	.99524	1.12187	12.64	
C650 Di-n-butylphthalate	1.29896	1.32697	2.16	
C655 Fluoranthene	1.89769	1.84882	4.45	*
C530 Terphenyl-d14	1.32611	1.34812	1.66	
C715 Pyrene	<del>1.89524</del> 1.87542	1.92547	1.59	
C720 Butylbenzylphthalate	.87542	.83942	4.13	
C725 3,3'-Dichlorobenzidine	<del>1.32724</del> 1.32724	.44176	34.79	
C730 Benzo(a)anthracene	<del>1.32724</del> 1.32724	1.34768	5.15	
C735 bis(2-Ethylhexyl)phthale	1.01512	1.03181	1.64	
C740 Chrysene	1.30206	1.26448	2.89	

RF - Response Factor from daily standard file at 50.00 UG/mL

RF - Average Response Factor from Initial Calibration Form VI

% - % Difference from original average or curve

C - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)

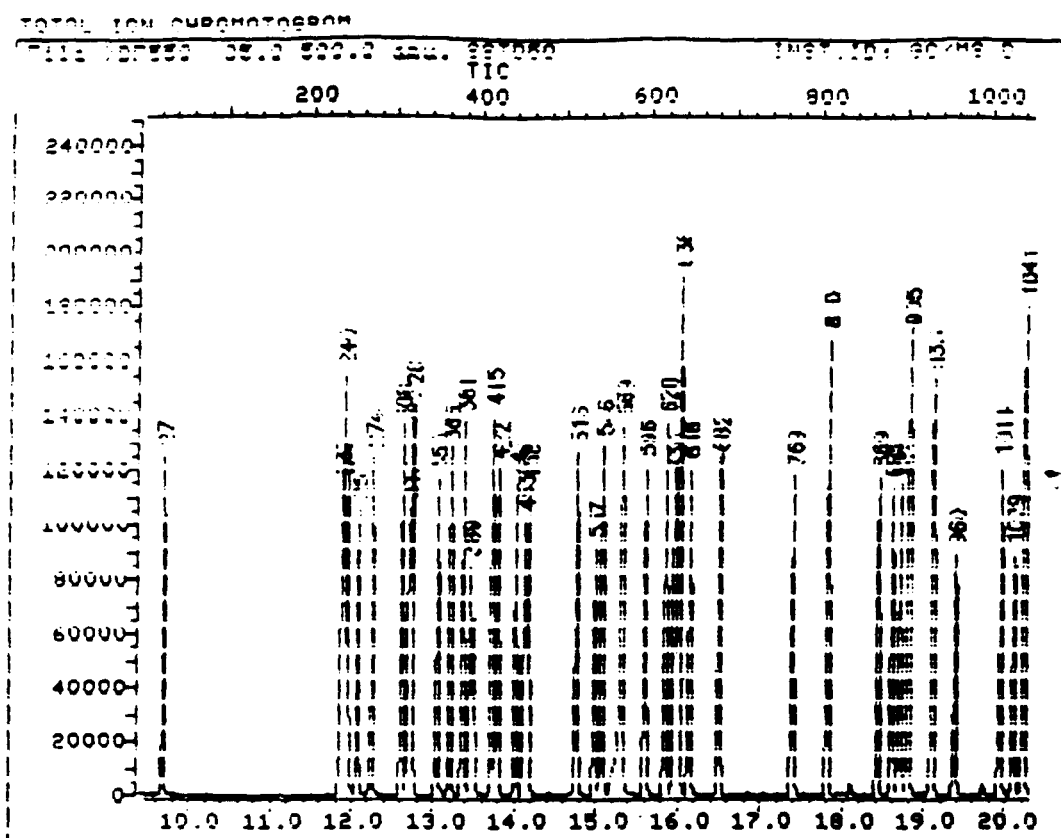
Continuing Calibration Check  
HSL Compounds

No: \_\_\_\_\_ Calibration Date: 10/12/89  
 Factor: ECDUA \_\_\_\_\_ Time: 07:31  
 Contract No: \_\_\_\_\_ Laboratory ID: >BF550  
 Instrument ID: GC/MS D \_\_\_\_\_ Initial Calibration Date: 10/09/89

Minimum RF for SPCC is 0.05 Maximum % Diff for CCC is 25.%

Compound	RF	RF	%Diff	CCC	SPCC
C760 Di-n-octylphthalate	1.67273	1.91212	14.31	*	
C765 Benzo(b)fluoranthene	1.43498	1.41838	1.16		
C770 Benzo(k)fluoranthene	1.09423	1.33215	21.74		
C775 Benzo(a)pyrene	1.18228	1.23735	4.66	*	
C780 Indeno(1,2,3-cd)pyrene	1.17818	1.14988	2.40		
C785 Dibenzo(a,h)anthracene	.91322	.90776	.60		
C790 Benzo(q,h,i)perylene	.97967	.94077	3.97		

- RF - Response Factor from daily standard file at 50.00 UG/mL  
 RF - Average Response Factor from Initial Calibration Form UI  
 - % Difference from original average or curve  
 - Calibration Check Compounds (\*) SPCC - System Performance Check Compounds (\*\*)



Data File: >BF550::C4  
 Name: SST050  
 Misc: INST.ID: GC/MS D

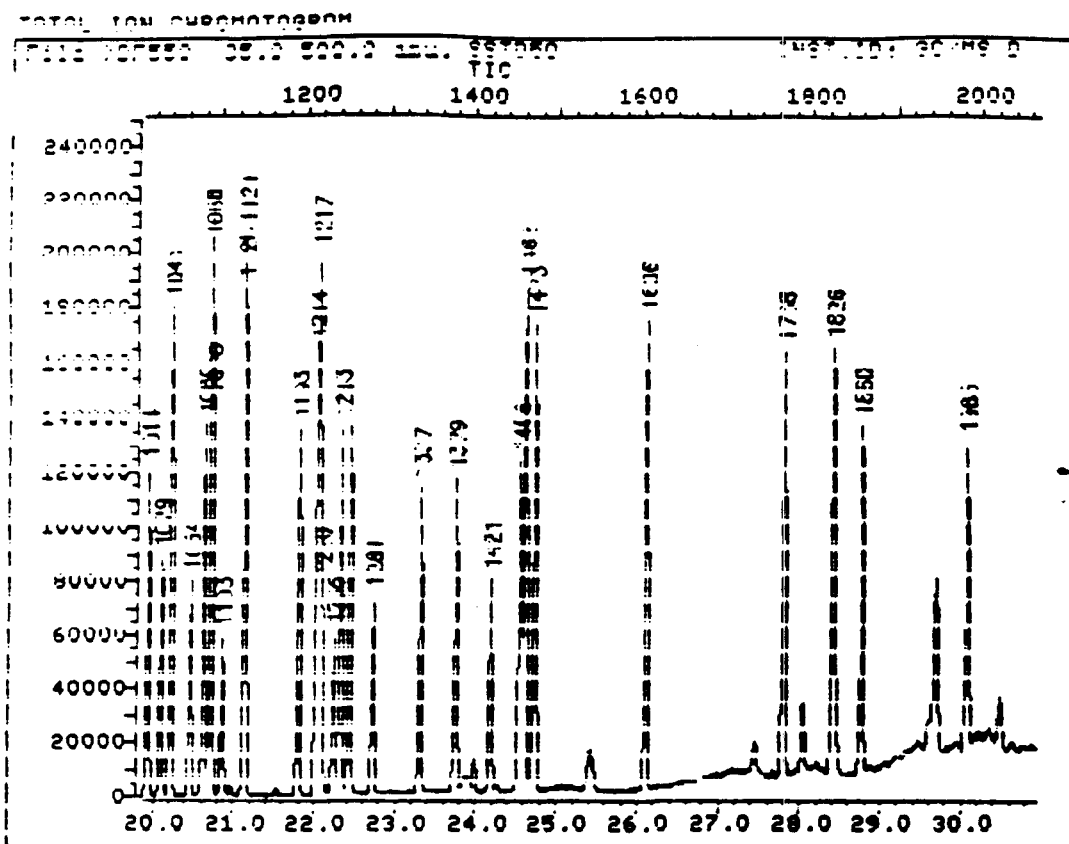
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BTLE# 1

Id File: ID2EPA::GM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891011 10:02

Operator ID: SHERRI  
 Quant Time: 891012 08:26  
 Injected at: 891012 07:31

TIC page 1 of 4



Data File: >BF550::C4  
 Name: SST050  
 Misc: INST.ID: GC/MS D

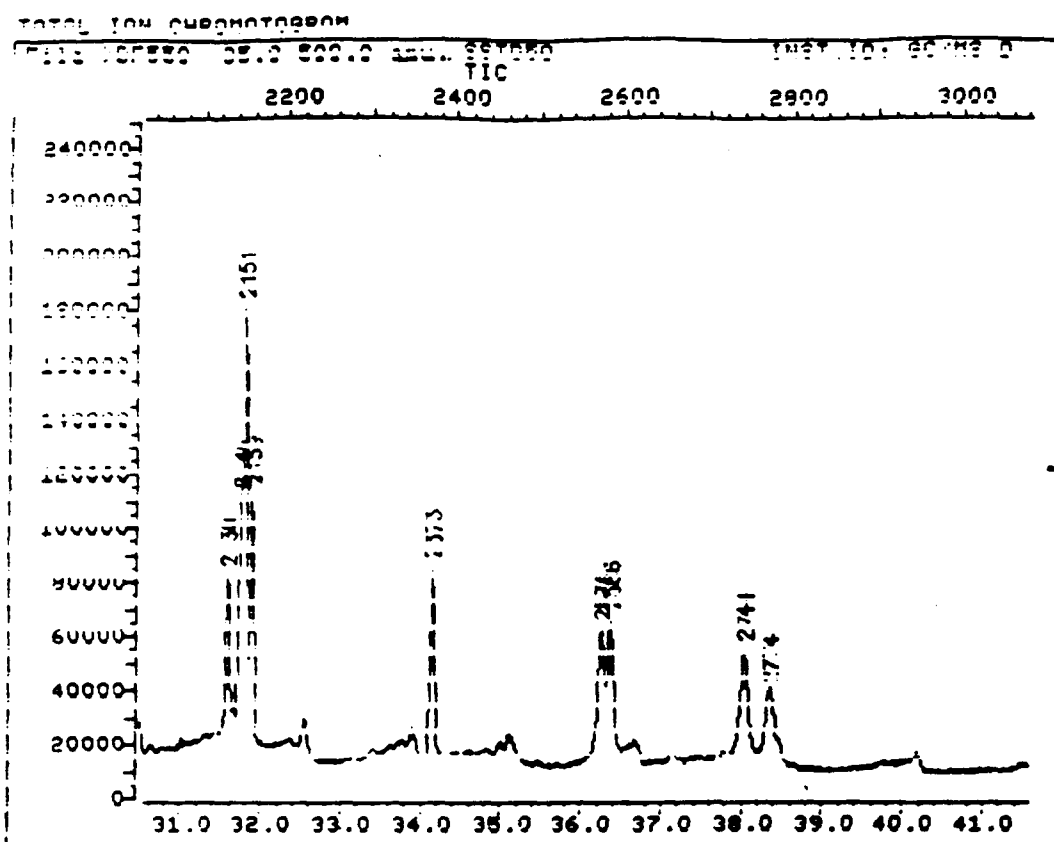
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BTL# 1

Id File: ID2EPA::GM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891011 10:02

Operator ID: SHERRI  
 Quant Time: 891012 08:26  
 Injected at: 891012 07:31

TIC page 2 of 4



Data File: >BF550::C4  
Name: SST050  
Misc: INST.ID: GC/MS D

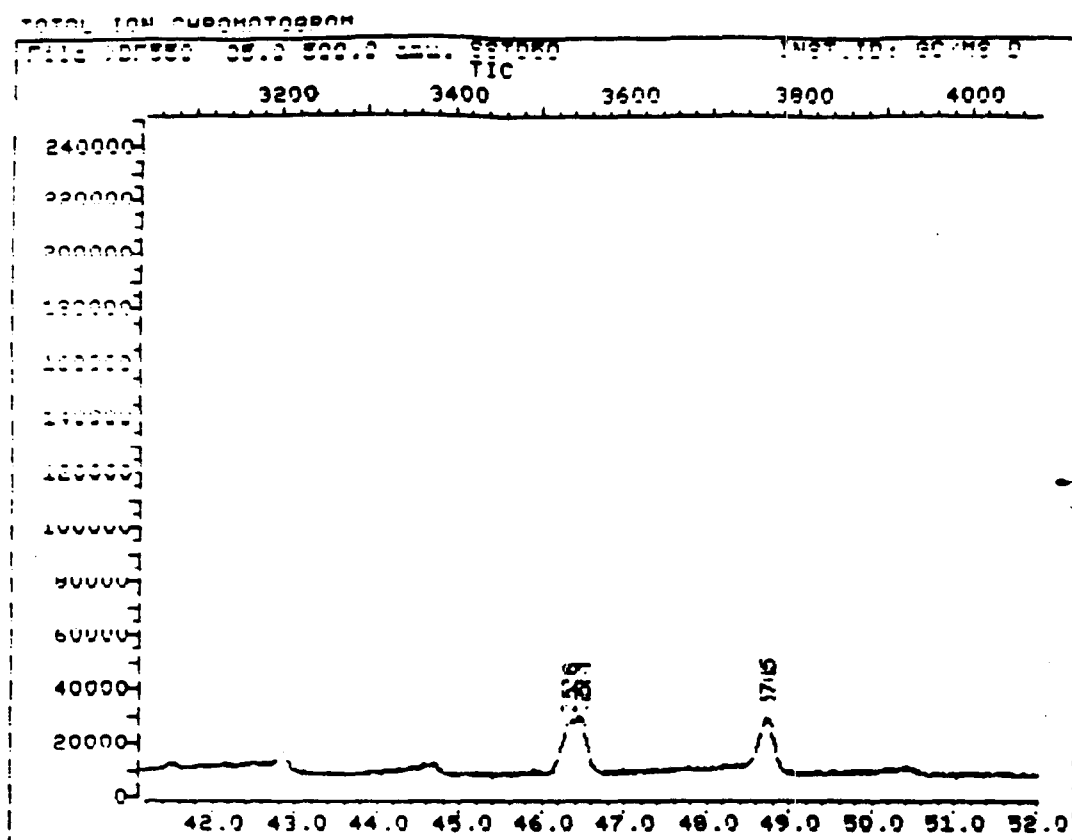
Quant Output File: ^BF550::QT

BTL# 1

Id File: 102EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891011 10:02

Operator ID: SHERRI  
Quant Time: 891012 08:26  
Injected at: 891012 07:31

TIC page 3 of 4



Data File: >BF550::C4  
 Name: SST050  
 Misc: INST. ID: GC/MS D

Quant Output File: ^BF550::Q1T

BTL# 1

Id File: ID2EPA::ISM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891011 10:112

Operator ID: SHERRI  
 Quant Time: 891012 08:26  
 Injected at: 891012 07:31

TIC page 4 of 4

QUANT REPORT

Operator ID: SHERRI  
Output File: ^BF550::QT  
Data File: ^BF550::C4  
Name: SSID50  
Misc: INST.ID: GC/MS D

Quant Rep: 6 Quant Time: 891012 08:26  
Injected at: 891012 07:51  
Dilution Factor: 1.00000

BIL# 1

ID File: ID2EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891011 10:02

	Compound	R.T.	Scan#	Area	Conc	Units	c
1)	*C130 1,4-Dichlorobenzene-d4	12.70	317	34817	40.00	UG/mL	99
2)	CS50 2-Fluorophenol	9.48	27	60553	52.70	UG/mL	83
3)	CS45 Phenol-d5	11.86	237	65886	52.46	UG/mL	94
4)	C315 Phenol	11.90	240	85916	56.09	UG/mL	94
5)	C325 bis(2-Chloroethyl)ether	12.07	257	68438	53.47	UG/mL	98
6)	C330 2-Chlorophenol	12.25	274	62685	52.10	UG/mL	95
7)	C335 1,3-Dichlorobenzene	12.60	308	69259	51.23	UG/mL	99
8)	C340 1,4-Dichlorobenzene	12.73	320	70594	53.23	UG/mL	98
9)	C345 Benzyl alcohol	13.04	350	38033	51.40	UG/mL	86
10)	C350 1,2-Dichlorobenzene	13.19	365	66964	51.97	UG/mL	97
11)	C355 2-Methylphenol	13.36	381	55663	52.45	UG/mL	95
12)	C360 bis(2chloroisopropyl)eth	13.44	389	121121	53.78	UG/mL	96
	C365 4-Methylphenol	13.71	415	54957	49.34	UG/mL	92
	C370 N-Nitroso-di-n-propylami	13.79	422	50372	50.84	UG/mL	85
	C375 Hexachloroethane	14.01	443	33125	52.69	UG/mL	95
16)	*C140 Naphthalene-d8	15.95	630	132472	40.00	UG/mL	84
17)	CS20 Nitrobenzene-d5	14.11	453	71674	51.77	UG/mL	90
18)	C410 Nitrobenzene	14.16	458	68495	52.48	UG/mL	94
19)	C415 Isophorone	14.76	516	123634	49.87	UG/mL	92
20)	C420 2-Nitrophenol	14.98	537	38541	49.65	UG/mL	90
21)	C425 2,4-Dimethylphenol	15.08	546	60179	50.87	UG/mL	94
22)	C430 Benzoic acid	15.32	569	34759	61.39	UG/mL	95
23)	C435 bis(2-Chloroethoxy)metha	15.32	569	81932	52.23	UG/mL	97
24)	C440 2,4-Dichlorophenol	15.60	596	53124	48.00	UG/mL	84
25)	C445 1,2,4-Trichlorobenzene	15.85	620	60426	49.01	UG/mL	97
26)	C450 Naphthalene	16.01	636	183190	52.12	UG/mL	93
27)	C455 4-Chloroaniline	16.14	648	73625	50.35	UG/mL	91
28)	C460 Hexachlorobutadiene	16.49	682	34441	47.24	UG/mL	85
29)	C465 4-Chloro-3-methylphenol	17.40	769	52099	46.48	UG/mL	73
30)	C470 2-Methylnaphthalene	17.82	810	98215	48.26	UG/mL	93
31)	*C150 Acenaphthene-d10	20.63	1080	79031	40.00	UG/mL	97
32)	CS25 2-Fluorobiphenyl	18.81	905	132833	52.89	UG/mL	93
33)	CS55 2,4,6-Tribromophenol	22.72	1281	20788	43.08	UG/mL	79
34)	C510 Hexachlorocyclopentadien	18.43	869	45412	61.13	UG/mL	96
35)	C515 2,4,6-Trichlorophenol	18.60	885	39733	49.68	UG/mL	99
36)	C520 2,4,5-Trichlorophenol	18.71	895	41649	48.14	UG/mL	98
37)	C525 2-Chloronaphthalene	19.10	933	115045	51.74	UG/mL	94
	C530 2-Nitroaniline	19.38	960	36237	50.02	UG/mL	83
	C535 Dimethylphthalate	19.94	1014	132944	47.62	UG/mL	79
	C540 Acenaphthylene	20.22	1041	200695	51.02	UG/mL	88
41)	C545 3-Nitroaniline	20.46	1064	33925	46.14	UG/mL	88
42)	C550 Acenaphthene	20.71	1088	124230	51.19	UG/mL	98
43)	C555 2,4-Dinitrophenol	20.73	1090	16287	52.07	UG/mL	71

	Compound	R.T.	Scan#	Area	Conc	Units	d
45)	C560 4-Nitrophenol	20.87	1103	12628	43.17	UG/mL	84
46)	C565 Dibenzofuran	21.13	1128	157141	50.73	UG/mL	88
46)	C570 2,4-Dinitrotoluene	21.14	1129	40016	46.03	UG/mL	87
47)	C543 2,6-Dinitrotoluene	20.10	1029	33183	47.55	UG/mL	75
48)	C580 Diethylphthalate	21.81	1193	141239	45.86	UG/mL	95
49)	C595 4-Chlorophenyl-phenyleth	22.02	1214	62819	49.78	UG/mL	92
50)	C590 Fluorene	22.06	1217	131892	52.13	UG/mL	97
51)	C595 4-Nitroaniline	22.09	1220	32622	46.63	UG/mL	88
52)	*C160 Phenanthrene-d10	24.55	1456	135155	40.00	UG/mL	83
53)	C610 4,6-Dinitro-2-methylphen	22.24	1235	26266	50.36	UG/mL	85
54)	C615 N-Nitrosodiphenylamine	22.33	1243	86473	51.13	UG/mL	90
55)	C625 4-Bromophenyl-phenylether	23.31	1337	38590	50.26	UG/mL	84
56)	C630 Hexachlorobenzene	23.74	1379	43176	47.58	UG/mL	94
57)	C635 Pentachlorophenol	24.18	1421	25051	47.38	UG/mL	91
58)	C640 Phenanthrene	24.61	1462	186581	51.08	UG/mL	93
59)	C645 Anthracene	24.72	1473	189397	51.18	UG/mL	93
60)	C650 Di-n-butylphthalate	26.11	1606	224183	47.49	UG/mL	83
61)	C655 Fluoranthene	27.80	1768	177191	43.85	UG/mL	96
62)	*C170 Chrysene-d12	31.81	2151	71356	40.00	UG/mL	93
63)	C530 Terphenyl-d14	28.76	1860	120246	51.80	UG/mL	90
64)	C715 Pyrene	28.41	1826	171742	52.31	UG/mL	92
65)	C720 Butylbenzylphthalate	30.07	1985	74872	47.32	UG/mL	91
66)	C725 3,3'-Dichlorobenzidine	31.59	2130	39403	63.21	UG/mL	88
67)	C730 Benzo(a)anthracene	31.75	2145	120199	47.66	UG/mL	90
	C735 bis(2-Ethylhexyl)phthala	31.81	2151	92032	46.92	UG/mL	96
	C740 Chrysene	31.90	2159	112778	47.06	UG/mL	87
	*C175 Perylene-d12	38.35	2774	56189	40.00	UG/mL	92
71)	C760 Di-n-octylphthalate	34.14	2373	134300	47.87	UG/mL	86
72)	C765 Benzo(b)fluoranthene	36.26	2575	99622	42.41	UG/mL	94
73)	C770 Benzo(k)fluoranthene	36.38	2586	93565	55.37	UG/mL	96
74)	C775 Benzo(a)pyrene	38.04	2744	86907	48.40	UG/mL	94
75)	C780 Indeno(1,2,3-cd)pyrene	46.32	3536	80763	47.42	UG/mL	91
76)	C785 Dibenzo(a,h)anthracene	46.48	3551	63758	47.85	UG/mL	87
77)	C790 Benzo(g,h,i)perylene	48.72	3765	66076	47.38	UG/mL	89

\* Compound is ISTD



88  
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Name: Ecova Corporation

Lab File ID (Standard): BF515

Date Analyzed: 10/10/89

Instrument ID: 70 2

Time Analyzed: 8:26

	IS1(DCB)		IS2(NPT)		IS3(ANT)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	53699.	12.65	217485.	15.92	133938.	20.60
UPPER LIMIT	107398.		434970.		267876.	
LOWER LIMIT	26849.		108743.		66969.	
EPA SAMPLE NO.						
01 2062-01	48598.	12.64	183952.	15.91	109247.	20.58
02 2078-01RE	49744.	12.65	154037.	15.90	100660.	20.59
03 2081-00MB	55824.	12.63	218788.	15.90	144892.	20.56
04 2062-02	54685.	12.63	203827.	15.90	112878.	20.57
05 2081-01	57961.	12.63	220837.	15.89	140854.	20.56
06 2081-02	63478.	12.63	248912.	15.89	161398.	20.56
07 2081-01MS	47851.	12.67	188177.	15.90	119888.	20.60
08 2081-01MSD	53631.	12.64	211685.	15.90	134199.	20.58
09 2081-03	37914.	12.63	156888.	15.90	104885.	20.58
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IS1 (DCB) = 1,4-Dichlorobenzene-d4      UPPER LIMIT = + 100%  
IS2 (NPT) = Naphthalene-d8              of internal standard area.  
IS3 (ANT) = Acenaphthene-d8              LOWER LIMIT = - 50%  
   of internal standard area.

Column used to flag internal standard area values with an asterisk

8C  
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Name: Ecova Corporation

ab File ID (Standard): >BF515

Date Analyzed:10/10/89

nstrument ID: 70 2

Time Analyzed: 8:26

	IS4(PHN)		IS5(CRY)		IS3(PRY)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	243355.	24.51	148358.	31.78	144746.	38.29
UPPER LIMIT	486710.		296716.		289492.	
LOWER LIMIT	121678.		74179.		72373.	
EPA SAMPLE NO.						
01 2062-01	177039.	24.51	116867.	31.78	100535.	38.29
02 2078-01RE	152042.	24.50	36780.*	31.85	53195.*	38.46
03 2081-00MB	282024.	24.48	142000.*	31.72	191169.	38.19
04 2062-02	158537.	24.49	102644.	31.75	91595.	38.23
05 2081-01	242664.	24.48	145922.	31.73	119807.	38.18
06 2081-02	293961.	24.48	201556.	31.73	179806.	38.20
07 2081-01MS	207382.	24.52	142490.*	31.78	122977.	38.21
08 2081-01MSD	226736.	24.49	149891.	31.74	123499.	38.19
09 2081-03	228728.	24.51	128508.*	31.73	142365.	38.20
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22						

IS4 (PHN) = Phenanthrene-d10  
IS5 (CRY) = Chrysene-d12  
IS6 (PRY) = Perylene-d12  
UPPER LIMIT = + 100%  
of internal standard area.  
LOWER LIMIT = - 50%  
of internal standard area.

\* Column used to flag internal standard area values with an asterisk

88  
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Ecove Corporation

Lab File ID (Standard): >BF538

Date Analyzed:10/11/89

Instrument ID: 70 2

Time Analyzed: 8:27

	IS1(DCB)		IS2(NPT)		IS3(ANT)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	66277.	12.61	255362.	15.87	165494.	20.55
UPPER LIMIT	132554.		510724.		330988.	
LOWER LIMIT	33139.		127681.		82747.	
EPA SAMPLE NO.						
2062-03	58464.	12.62	230350.	15.87	146783.	20.55
21 SBLK2	68682.	12.61	267073.	15.88	177013.	20.54
0312081-02	66586.	12.61	263391.	15.86	175954.	20.55
0412081-03	57109.	12.65	230716.	15.90	161126.	20.58
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20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4  
IS2 (NPT) = Naphthalene-d8  
IS3 (ANT) = Acenaphthene-d8  
UPPER LIMIT = + 100%  
of internal standard area.  
LOWER LIMIT = - 50%  
of internal standard area.

\* Column used to flag internal standard area values with an asterisk

8C  
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Name: Ecova Corporation

File ID (Standard): >BF538

Date Analyzed:10/11/89

Instrument ID: 70 2

Time Analyzed: 8:27

	IS4(PHN)		IS5(CRY)		IS3(PRY)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	310312.	24.45	205160.	31.70	173536.	38.10
UPPER LIMIT	620624.		410320.		347072.	
LOWER LIMIT	155156.		102580.		86768.	
EPA SAMPLE NO.						
01 2062-03	220754.	24.47	150223.	31.71	126774.	38.18
2 SBLK2	338105.	24.46	234842.	31.69	195215.	38.13
3 2081-02	329411.	24.46	262894.	31.70	227439.	38.14
4 2081-03	304126.	24.49	225899.	31.72	191392.	38.17
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21						
22						

IS4 (PHN) = Phenanthrene-d10  
IS5 (CRY) = Chrysene-d12  
IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100%  
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LOWER LIMIT = - 50%  
of internal standard area.

\* Column used to flag internal standard area values with an asterisk

30 Name: Ecova Corporation

Date Analyzed: 10/12/89

Time Analyzed: 7:31

[illegible]

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Column used to flag internal standard area values with an asterisk

8C  
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Lab File ID (Standard): >BF550

Date Analyzed: 10/12/89

Instrument ID: 70 2

Time Analyzed: 7:31

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05 2081-02	162950.	24.52	105147.	31.78	87803.	38.30
06 EDZ80RE	163870.	24.53	116148.	31.81	109348.	38.38
07 2067-02	150036.	24.53	91588.	31.79	73784.	38.33
08 EDZ97	160645.	24.54	102831.	31.81	91847.	38.38
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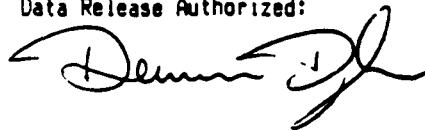
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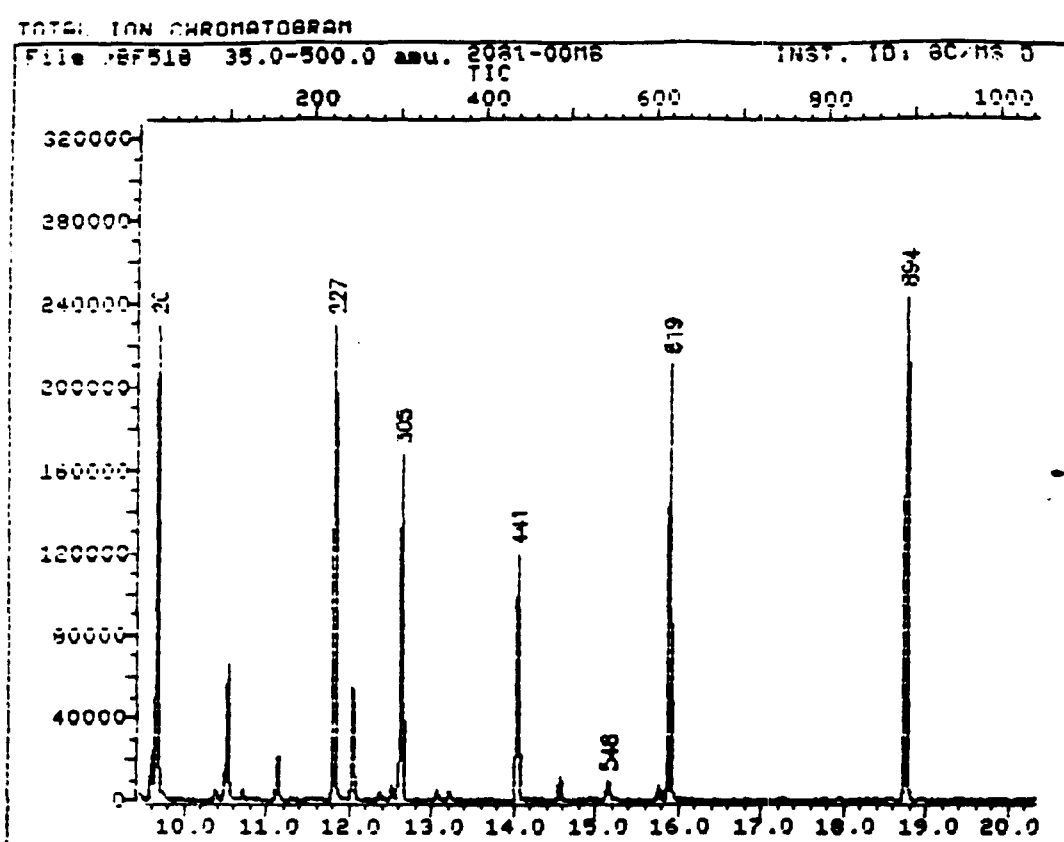
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Date Analyzed: 10/10/89

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Data Release Authorized:



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59-50-7	4-Chloro-3-methylphenol	330	U
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	1700	U
87-86-5	Pentachlorophenol	1700	U



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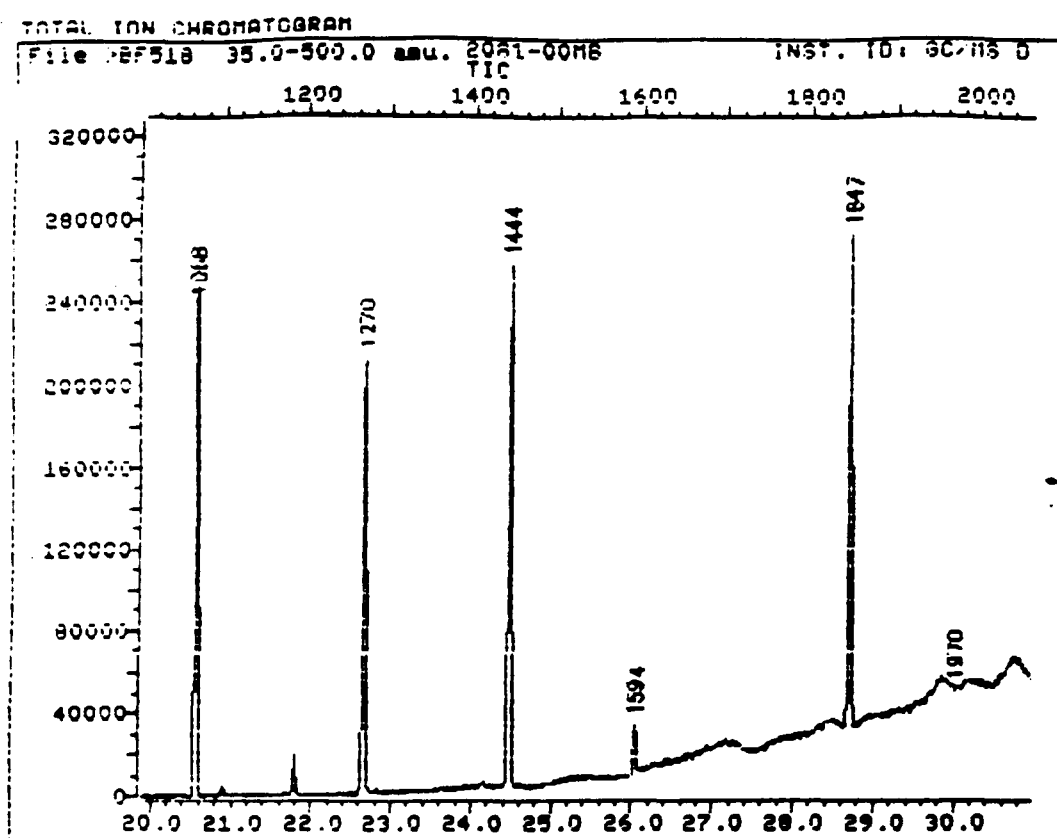
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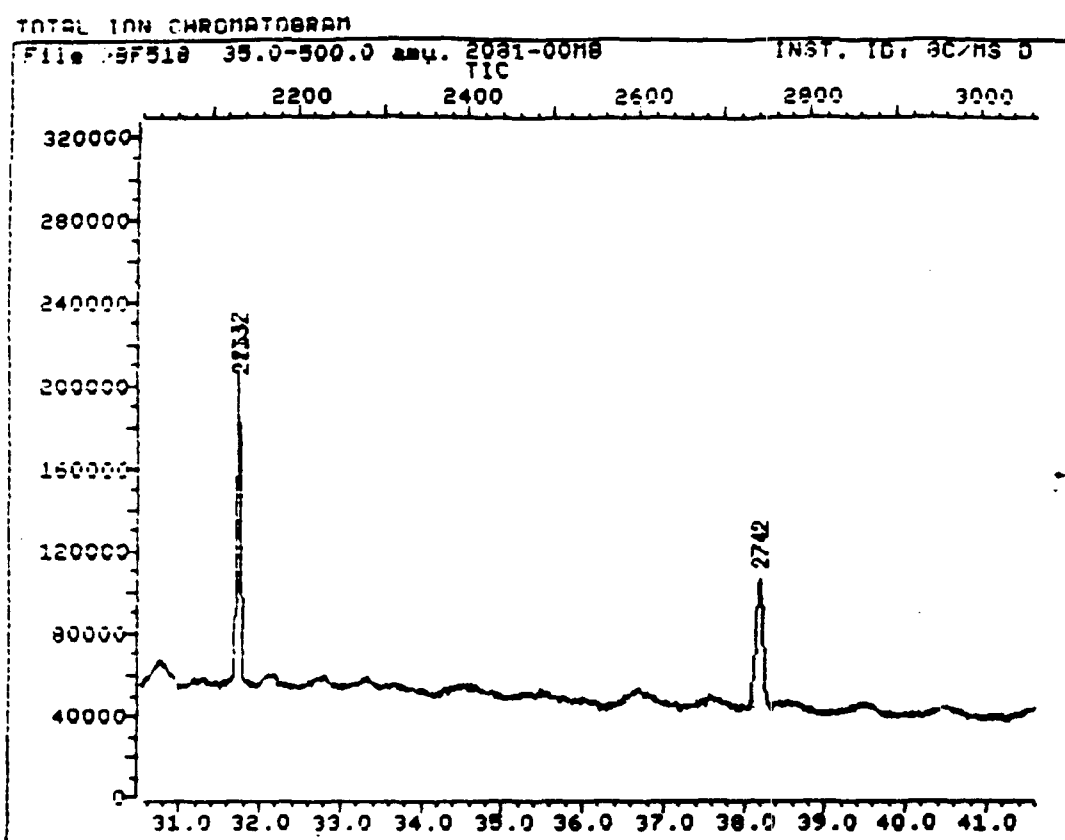
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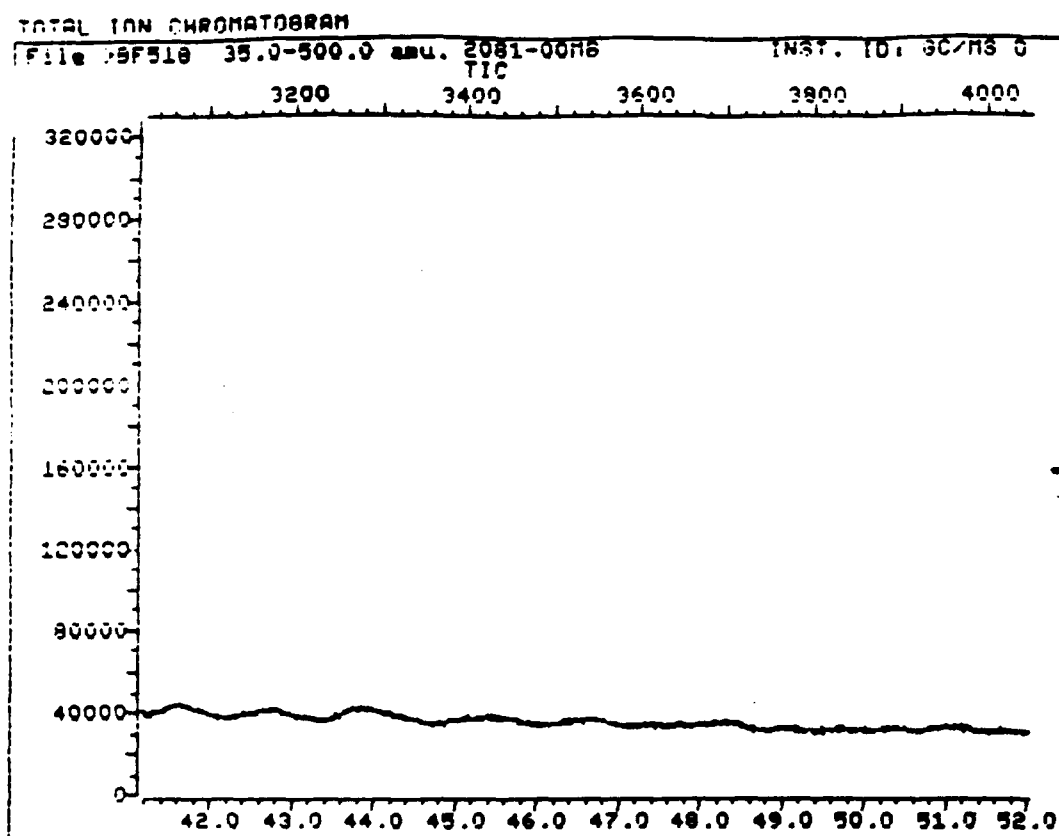
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TIC page 3 of 4



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Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: SHERRI  
Quant Time: 891010 12:37  
Injected at: 891010 11:41

TIC page 4 of 4

QUANT REPORT

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 Dilution Factor: 1.000000

Run # 1


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3)	CS45	Phenol-d5	99.0	227	153802	73.25	UG/mL	90
16)	*C140	Naphthalene-d8	136.0	619	218728	40.00	UG/mL	85
17)	CS20	Nitrobenzene-d5	82.0	441	74462	33.25	UG/mL	90
22)	CS30	Benzoic acid	122.0	548	4059	5.84	UG/mL	97
31)	*C150	Acenaphthene-d10	164.0	1068	144997	40.00	UG/mL	96
32)	CS25	2-Fluorobiphenyl	172.0	894	176850	56.78	UG/mL	95
33)	CS55	2,4,6-Tribromophenol	330.0	1270	71691	74.43	UG/mL	73
52)	*C160	Phenanthrene-d10	188.0	1444	282074	40.00	UG/mL	78
60)	CS50	Di-n-butylphthalate	149.0	1594	26788	2.87	UG/mL	83
62)	*C170	Chrysene-d12	240.0	2132	167005	40.00	UG/mL	91
71)	CS30	Terphenyl-d14	244.0	1847	236915	42.11	UG/mL	87
72)	CS35	bis(2-Ethylhexyl)phthalate	149.0	2153	15564	5.58	UG/mL	89
73)	*C175	Perylene-d12	264.0	2742	151165	40.00	UG/mL	90

\* Compound is ISTD

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

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Project Number: 891005-10  
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Concentration: Low Dilution Factor: 1  
Sample wt/vol: 30 g  
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Date Analyzed: 10/12/89

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Customer Sample: NA  
Sample Description: Method Blank  
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Time Collected: NA  
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Data Release Authorized: 

C.A.S. Number		UG/KG	
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120-83-2	2,4-Dichlorophenol	330	U
59-50-7	4-Chloro-3-methylphenol	330	U
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	1700	U
87-86-5	Pentachlorophenol	1700	U

# Bioremediation of PCP-Contaminated Soil: Bench to Full-Scale Implementation

William R. Mahaffey • Robert A. Sanford

William R. Mahaffey, PhD, is the vice president of technology development for ECOVA Corporation in Redmond, WA. He is a microbial physiologist by training. Robert A. Sanford was formerly a research associate at the same firm. He is currently a graduate student at Michigan State University.

Pentachlorophenol (PCP) is a widely used wood treatment agent and pesticide that is often listed among the contaminants at hazardous waste sites. Bench-scale studies were performed to develop a microbial culture and biodegradative process that could treat PCP at higher concentrations than previously reported. Several substrate formulations and culture techniques were evaluated. Ultimately a "self-feeding" (pH auxostat) continuous culture system (pH auxostat) was used to select for biodegradative activity with PCP as the carbon and energy source. After a period of 50 days, influent PCP concentrations reached 3,500 mg/liter at a dilution rate of  $0.066\text{ H}^{-1}$ . Of the total theoretical chloride that could be released from PCP, 99% was detected as free chloride in the reactor effluent. PCP analysis of the effluent verified complete degradation by the microbial consortium. The reactor was converted to a constant PCP feed. At steady state conditions, the dilution rate was  $0.05\text{ H}^{-1}$  with an influent PCP concentration of 2,560 mg/liter and a biomass yield of 0.18 mg (dry weight) per mg of PCP. Mineralization studies performed with the microbial consortium using  $[U-^{14}\text{C}]\text{-PCP}$  indicated that 36.5% of the label was released as  $^{14}\text{C}$ -carbon dioxide.

During operations at a PCP-formulating facility, significant quantities of PCP solutions were spilled, resulting in the contamination of an estimated 3,400 cubic yards of soil. Representative soil samples from the site revealed PCP concentrations ranging from 2 mg/kg to 8,000 mg/kg. Several treatability studies were performed to determine the efficacy of a slurry-phase bioremediation process for these soils. Results of the study showed little if any indigenous microbial degradative potential. Inoculation with the PCP-degrading consortium resulted in the degradation of PCP to below detectable levels ( $<1.0\text{ ppm}$ ) as measured by high-pressure liquid chromatography. Data from laboratory treatability studies were used to design and implement the full-scale remediation process. The process involves soil washing to remove PCP from the soils followed by bioremediation of the pregnant wash solution in a slurry-phase bioreactor. The PCP-degrading consortium is grown on site and serves as the inoculum for the full-scale treatment reactors. Results from the field operations during the first two

indicator. A washed cell suspension from the chemostat was added to provide a cell density of  $10^9$  cells/ml. Vials were capped and incubated at 20°C for 1 week. The systems were acidified and purged with carbon dioxide free air into a trapping solution of 0.2 N NaOH. After 15 minutes of purging 1.0 ml aliquots of the trapping solution were sampled and added directly to 14 ml of scintillation cocktail (Beckman MP). To be sure that no radiolabeled PCP was present in the carbon dioxide traps, a barium chloride precipitation was performed on aliquots of the trapping solution and residual radioactivity quantitated.

Slurry-phase treatability studies were performed in 250-ml Erlenmeyer flasks containing Bushnell-Haas medium. Slurries are designated on the basis of their percent solids and were prepared at soil/volume ratios of 5%, 15%, 25%, and 40%. Flasks were incubated at 25°C on a rotary shaker in the dark, and duplicate flasks were sacrificed overtime. With the exception of the 25% slurry, the pH of all other slurries was maintained at neutrality (pH 7.5). Inoculation of slurries was made with the chemostat consortium to achieve a cell density of approximately  $10 \times 10^6$  cells/ml.

Soil washing experiments were performed in 250 ml-Erlenmeyer flasks using a 25% (w/v) ratio of solids to wash solution. Various alkaline wash reagents were evaluated. The exact nature of the washing reagent used for this process has been classified as confidential business information at this time. Particle size analysis of site soil was performed using U.S. standard sieves and followed standard method protocol as described in ASTM method D-422.

## RESULTS

### Bench-Scale Bioreactor Studies

A schematic representation of the bench scale bioreactor is presented in **Figure 1**. PCP was fed to the reactor from a separate feed reservoir to facilitate greater control off the feeding rate. Since PCP is quite soluble under alkaline conditions, it was always added to the reactor in this form. The Bioflo reactor was operated with a number of substrate formulations in an attempt to increase the PCP-degrading biomass by providing cosubstrates. **Table 1** illustrates the various formulations that were utilized. As can be seen in **Figure 2**, each substrate formulation yielded differences in the extent and rate of PCP degradation as evaluated on the basis of dechlorination activity. The results indicate that formulations 1-4 resulted in repression of dechlorination activity as compared to formulations 5 and 6 where PCP was the sole source of carbon.

During the evaluations of the various substrate formulations, it became apparent that as a result of PCP biodegradation five equivalents of HCl could be produced. Therefore the PCP feed was formulated to provide an equimolar amount of NaOH to neutralize the acid formed. It was hypothesized that the addition of PCP based on the production of acid may be an efficient means of regulating the continuous flow process. This was implemented by interfacing PCP addition to a pH controller, which actuates the feed pump when the pH drops below a set point. The addition

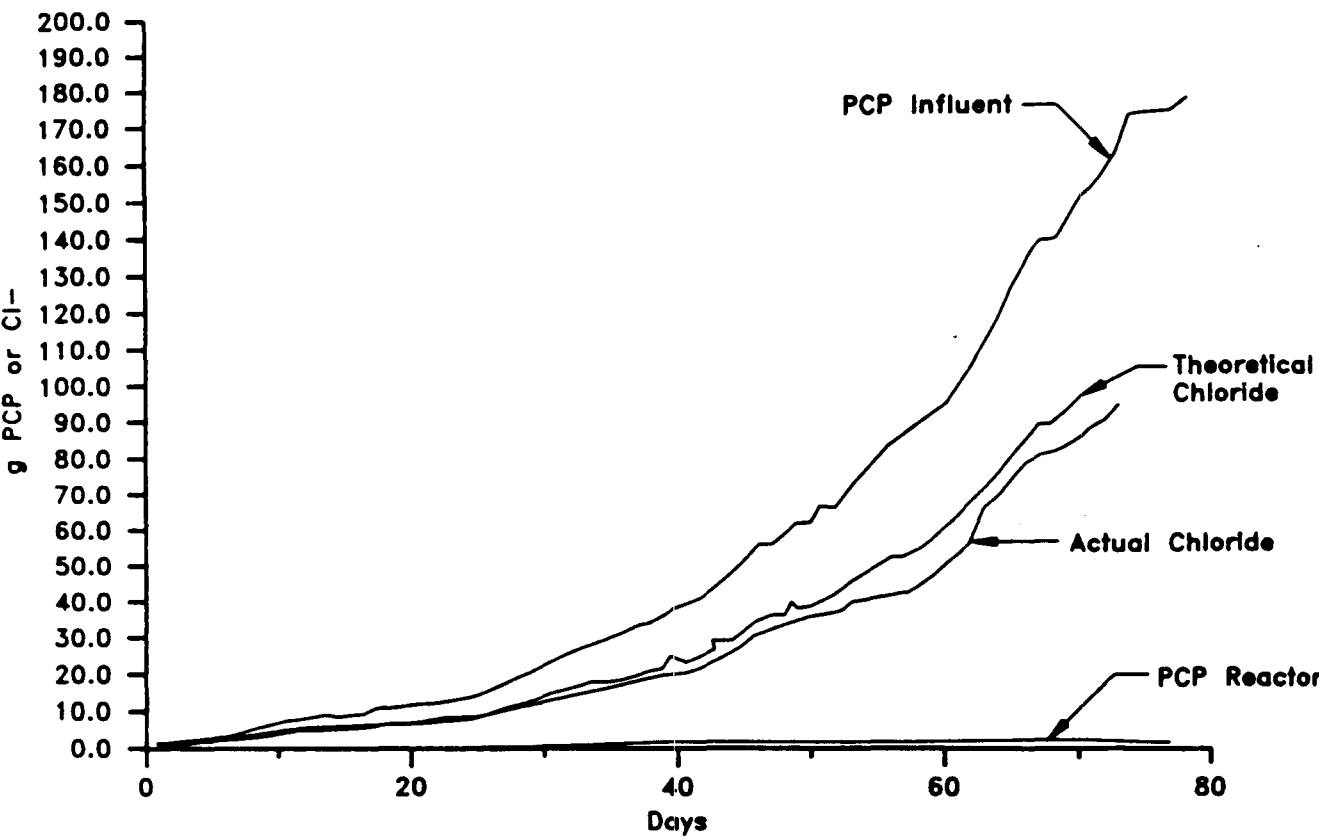
**Table 1.** Substrate formulations used during bench-scale evaluation.

FORMULATION	REAGENTS	CONCENTRATION
1	PCP	0.04 M
	Sodium acetate	0.05 M
	Peptone (P)	532 mg/liter
	Yeast Extract (Y)	532 mg/liter
	NaOH	0.2 N
2	PCP	0.04 M
	Sodium acetate	0.02 M
	P/Y (1:1)	266 mg/liter
	NaOH	0.2 N
3	PCP	0.04 M
	Sodium acetate	0.025 M
	P/Y (1:1)	266 mg/liter
	NaOH	0.174 N
4	PCP	0.04 M
	Sodium acetate	0.025 M
	P/Y (1:1)	266 mg/liter
	NaOH	0.185 N
5	PCP	0.04 M
	NaOH	0.21 N
6	PCP	0.04 M
	NaOH	0.22 N

feeding” mode substrate formulations 1-3 were evaluated with no apparent enhancement of daily input of PCP (**Figure 4**). On day 23 the NaOH level was reduced to compensate for the amount of base that would be produced as a result of the mineralization of sodium acetate. Apparently this excess of NaOH was enough to cause a reduction in the demand for the alkaline PCP feed. Subsequent to this adjustment, the daily PCP loading rate to the reactor continued to increase for a period of 10 days approaching 3.0 grams per “day.” However, it was observed that some breakthrough of PCP to the effluent was occurring. On day 34 an adjustment to increase the NaOH (formulation 4) was required to eliminate the breakthrough of PCP. Stable operation of the reactor was achieved with a processing rate of 2.8 grams of PCP per day. On day 60 the reactor was converted over to operations with PCP as the sole source of carbon and energy (formulations 5 and 6). As a result the daily loading rate of PCP



**Figure 3.** Effects of "self-feeding" operations on the performance of the continuous culture bioreactor in degrading PCP.

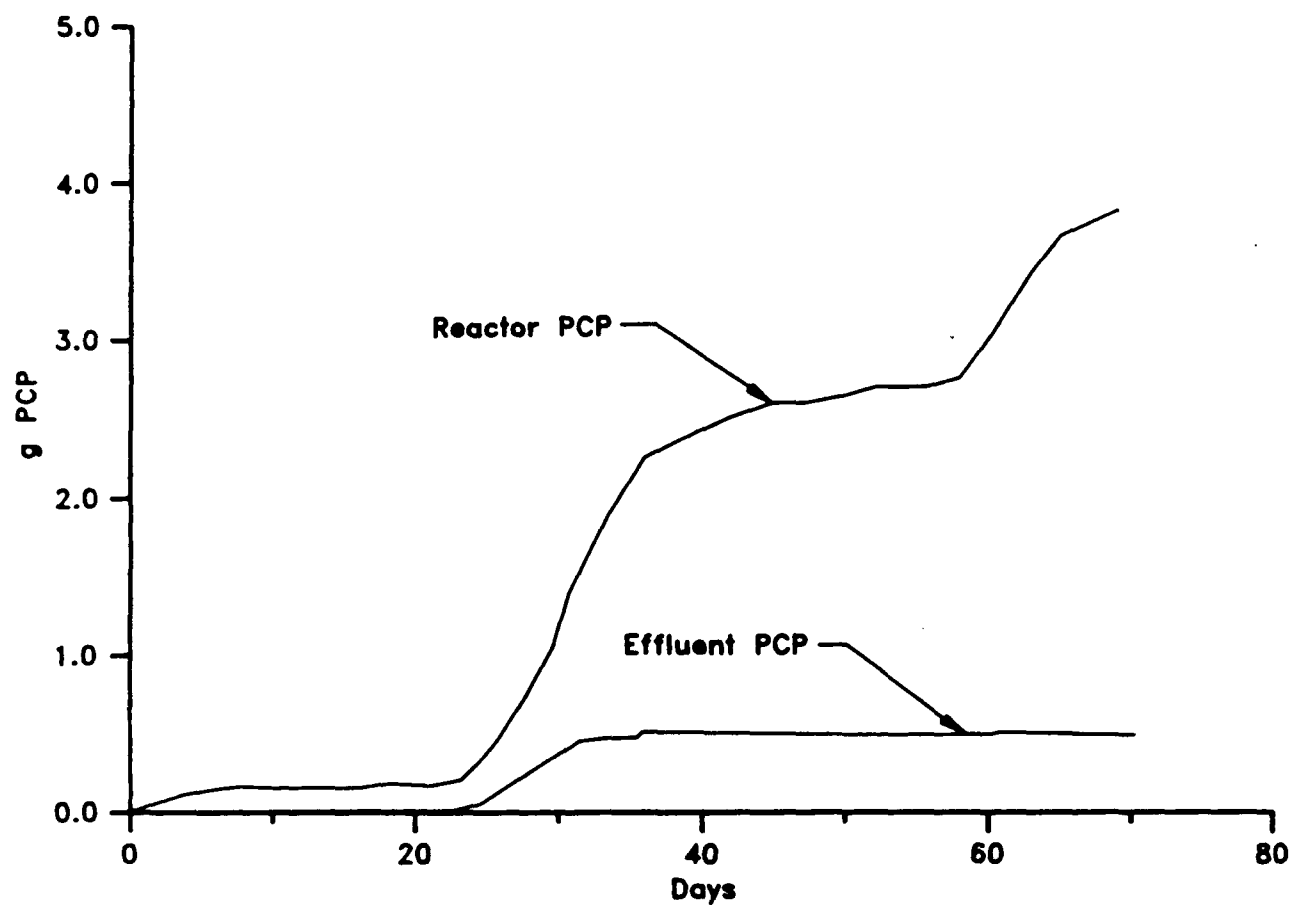


to the reactor increased to 3.8 grams/day without any increased break-through of PCP to the effluent.

A result of operating the reactor as a "self-feeding" pH auxostat was that as the demand for PCP feed increased the dilution rate increased proportionately. **Figure 5** shows the fluctuations in dilution rate during that period of operation when the reactor was in the self-feeding mode. It is apparent from these data that the reactor efficiency was increasing throughout the study. After 60 days of operation the bioreactor was processing 3.8 grams/1.25 liters at a dilution rate 0.065 or the equivalent of 5.5 grams/day of PCP (Table 2).

During the continuous culture experiments the reactor was converted to operation at continuous influent feed of PCP (2,560 mg/liter) as the sole carbon and energy source. Under these conditions it was necessary to operate at a retention time of 31.45 hours. **Table 3** provides synopsis of the data on critical process parameters at steady state. The population density was measured as total heterotrophic bacteria and averaged  $9 \times 10^9$  cells/ml. Attempts to enumerate PCP degraders and selective media (Saber 1985) were unsuccessful. We believe this may be a reflection of the strong

**Figure 4.** Profile of the total daily PCP load to the bioreactor during optimization of the "self-feeding" process and the breakthrough of PCP in reactor effluents.



#### Application of the PCP Consortium to a Bioremediation

##### *Site Description and Treatability Testing*

Operations at a former PCP-formulating facility resulted in the contamination of an estimated 3,000 cubic yards of site soil. The client assumed a proactive posture and retained ECOVA to evaluate and design a bioremediation program for their site. A biotreatability study was required to convince the client of the feasibility of a bioremediation program specific for PCP. The results of a simple slurry-phase biotreatability study, performed on soils contaminated with high concentrations of PCP, is summarized in **Figure 6**. During the first 2 weeks of the study, there was little if any PCP biodegradation in any of the various slurries tested (e.g., 5%-40% soil solids). On day 13 each of the slurries received an inoculum of the PCP consortium to yield approximately  $1 \times 10^8$  cells/ml of slurry. PCP was biodegraded to less than 2.0 mg/liter, with the exception of the 25%

**Table 3.** Critical process parameter measurements during steady-state conditions of the bioreactor at a constant influent PCP concentration.

PARAMETER	VALUE
Influent concentration	2560 Mg/liter
Dilution rate (D)	0.032 h-1
Temperature	20.1°C
Cell density <sup>a</sup>	0.66
Total heterotrophs	9.5 x 10 <sup>9</sup> cells/ml
Biomass yield per mg PCP <sup>b</sup>	18% (0.18 mg/mg PCP)
Biomass yield per mg/carbon	66% (0.66 mg/mg PCP)
Residual PCP in reactor	ND (0.5 mg/liter)
Residual chloride in reactor	1760 mg/liter
Chloride as % of theoretical	103%
Specific O <sub>2</sub> uptake rate	0.25 μmoles/min/mg

- a
 Turbidity measurement obtained with a Klett-Summerson colorimeter equipped with a blue filter (330 nm).
- b
 Biomass yields are calculated on a dry-cell-weight basis.

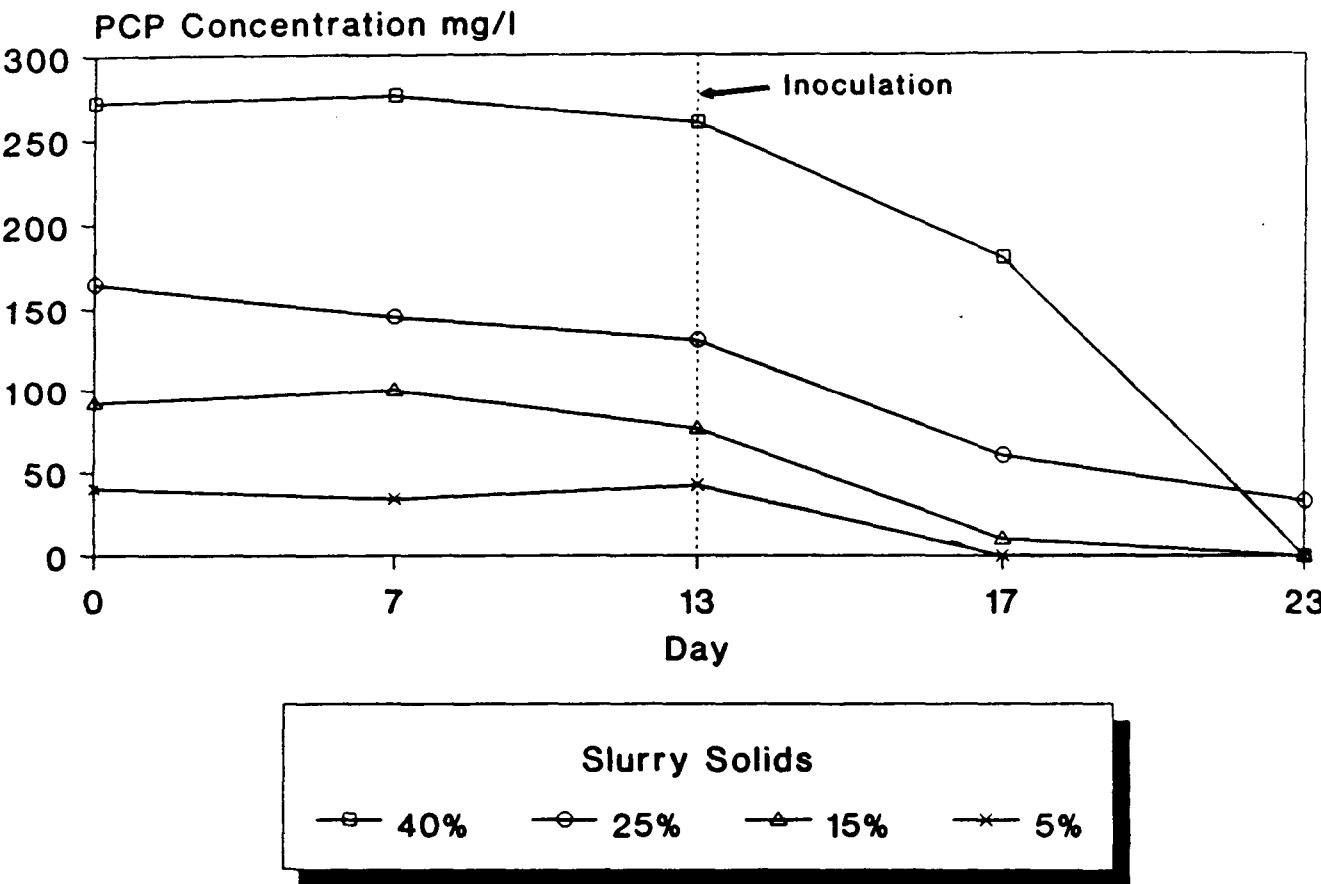
material greater than 60 mesh constitutes approximately 80% of the total soil volume. A soil-washing solution was formulated and found to be highly efficient in removing PCP from the soil particles larger than 60 mesh (Table 5).

*Site Operations*

Based upon the information developed during bench-scale treatability testing, ECOVA has designed and begun the implementation of a full-scale remediation program for PCP-contaminated soils. This program is centered on a combination soil-washing and screening process, which results in the removal of PCP to a cleanup level of 0.5 mg/kg soil. Field data from site operations are presented in Table 6 along with the laboratory data for comparative purposes. The system is designed to process 15-30 cubic yards of soil a day. The resulting wash solution is a slurry that contains the PCP and the <60-mesh soil particles at approximately a 20% solids loading. This material is subsequently treated in on-site slurry phase bioreactors that have been inoculated with the PCP-degrading consortium. A general schematic of the field operations is presented in Figure 8.

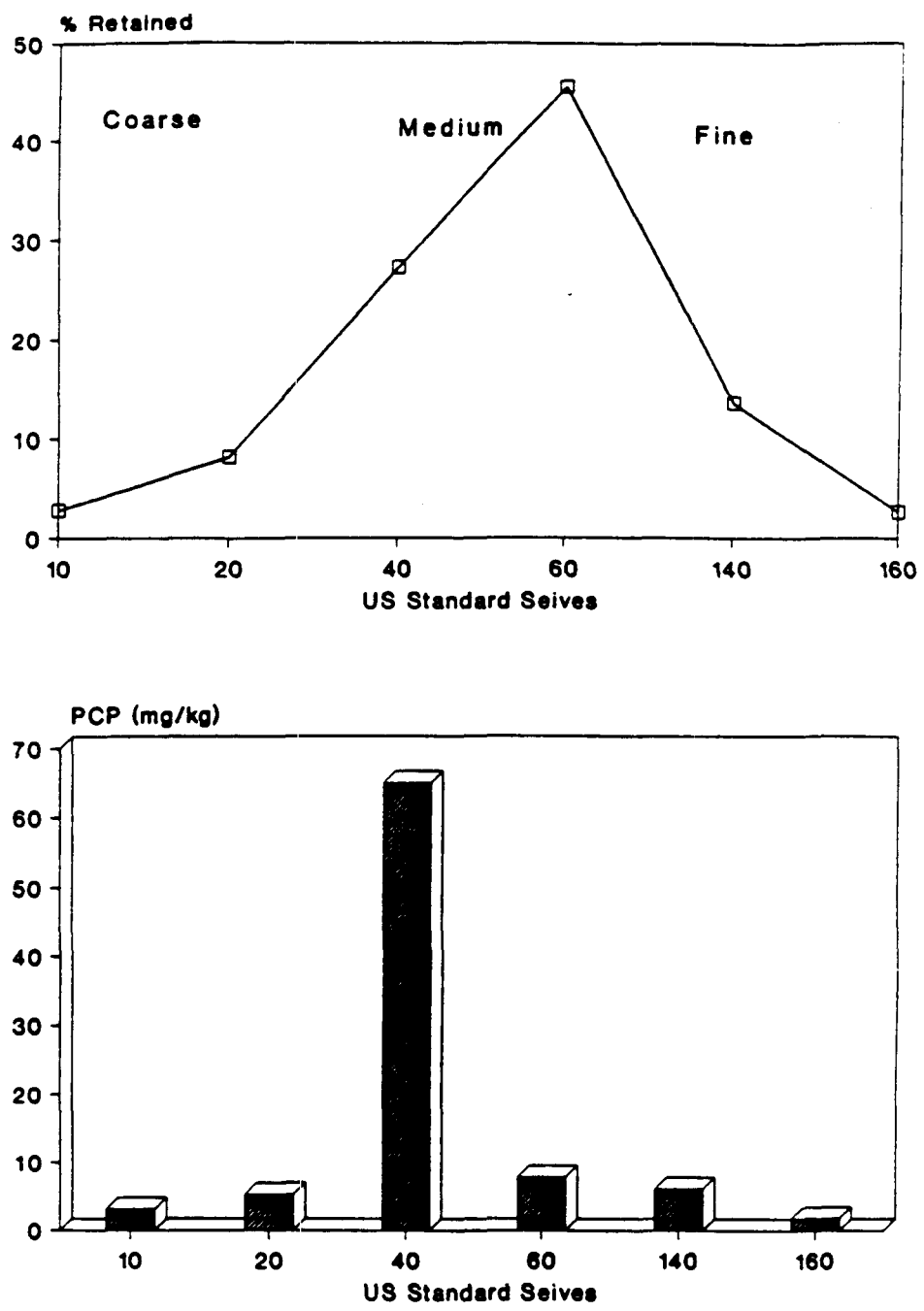
During startup of site operations, two 25,000-gallon slurry bioreactors were operated in batch mode in order to demonstrate the utility of

**Figure 6.** Results of the slurry phase biotreatability evaluation demonstrating the enhanced biodegradation of PCP in contaminated soils by supplementation with a microbial consortium capable of PCP mineralization.



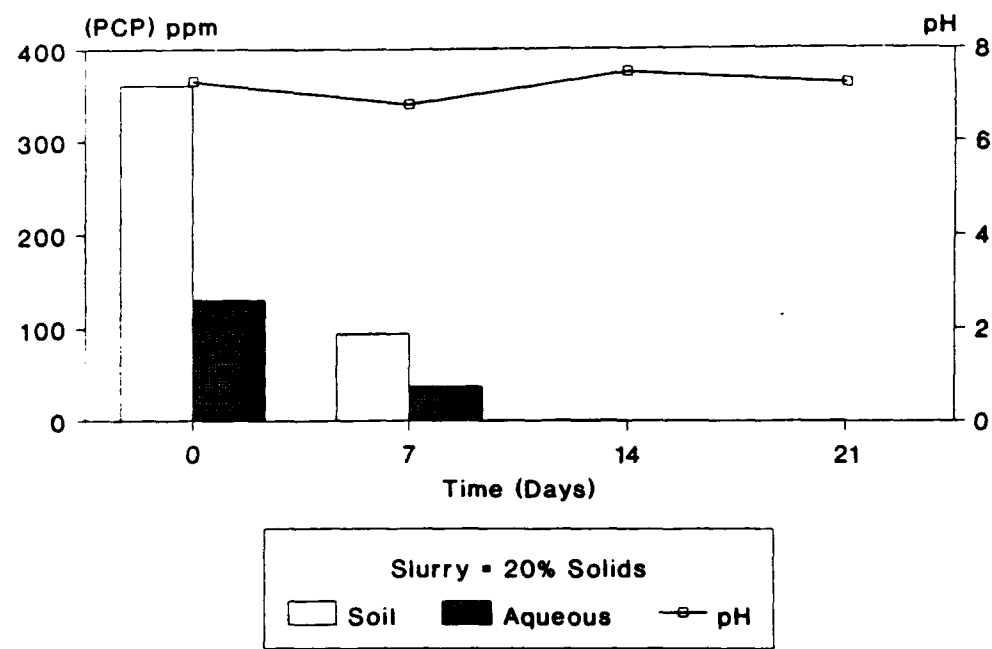
effectively suspended. After charging the reactor with soil and water an oily solvent sheen (mineral spirits) could be detected at the air/slurry interface. Based on the results of a total petroleum hydrocarbon analysis (Infrared method), the levels of hydrocarbon were 15,000 mg/liter, indicating that a hot spot had been excavated from the stockpile. The tank was seeded with an inoculum of the PCP consortium to achieve approximately  $10^7$  cells/ml of slurry on day 0. During the first 5 days of operation, the aqueous PCP levels were reduced by about 40% (Figure 11). However, PCP concentrations on the soil increased threefold, correlated with the loss of solvent from the system. Apparently the solvents serve as a reservoir for PCP that partitions onto the soil particles as the solvent is stripped from the system. Subsequently the PCP on the soil particles was observed to undergo biodegradation. The rates of PCP degradation in this system are much slower than those observed in Tanks 1 and 2. The total treatment time required to achieve the target cleanup level of 0.5 mg/kg was 30 days.

**Figure 7.** Results of the treatability evaluations to obtain particle size analysis and the distribution of pentachlorophenol in contaminated site soils.

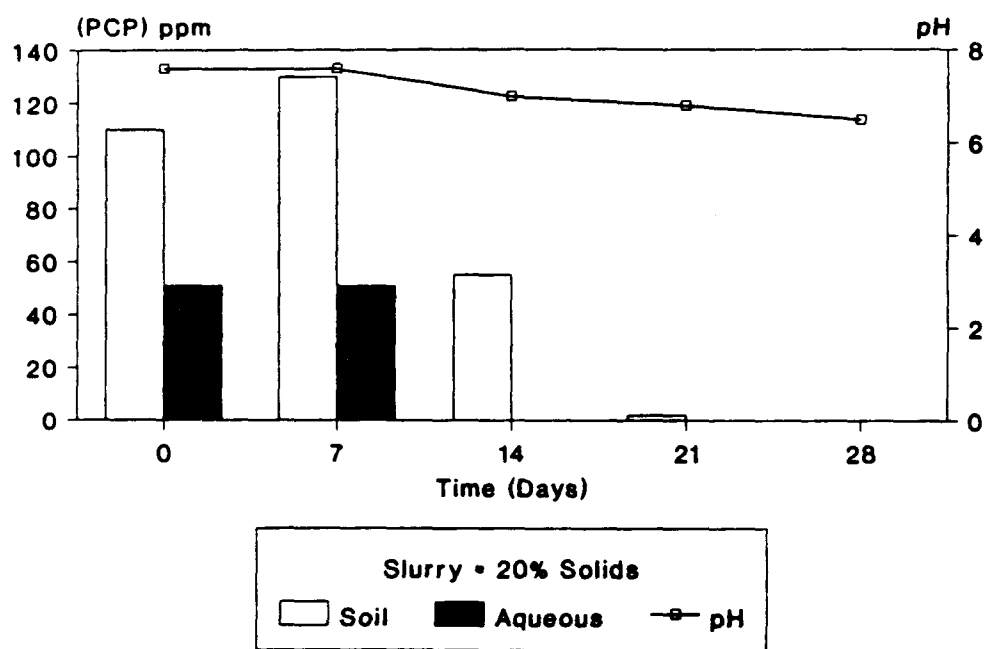


mg/kg. A maximum of 30 cubic yards of soil can be processed daily yielding roughly 900 cubic yards per month. Roughly 80% of this soil volume or 720 cubic yards of clean soil can be discharged directly to a disposal pit without further processing. The remaining 180 cubic yards

**Figure 9.** Field data from Tank 1 operations for the bioslurry treatment of solutions generated during soil washing. The system was inoculated with the PCP degrading consortium at time zero to yield approximately  $10^7$  cells/ml of slurry.



**Figure 10.** Field data from Tank 2 operations for the bioslurry treatment of solutions generated during soil washing. The system was inoculated with the PCP degrading consortium on day 7 to yield approximately  $10^7$  cells/ml of slurry.



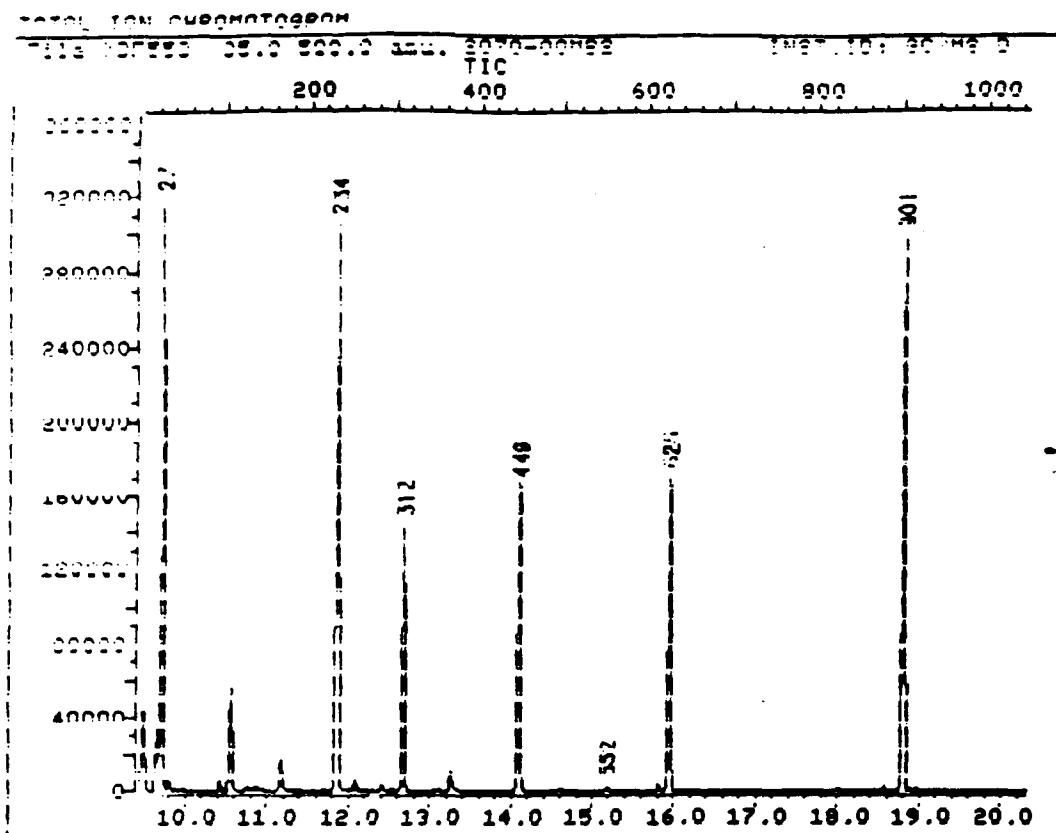
of research can there be efficient transfer of new technology to the field of hazardous waste remediation. ■

#### REFERENCES

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#### ACKNOWLEDGEMENTS

Special thanks to Robert Sanford for his ingenuity in implementing the concept of pH-controlled feeding for the bench scale bioreactor studies. In addition Joanne Chee, Jan Marshall-Knoll, and Kathy Hill have been instrumental in operating and maintaining the PCP bioreactor for well near two years of continuous operation. This has enabled us to develop further our understanding of the microbial consortium. Many thanks to Mark Anderson and John Hancock for the engineering design and Jay Kraft, Dan Schweigel, and Jim Borthen for all their hard work with on-site operations.



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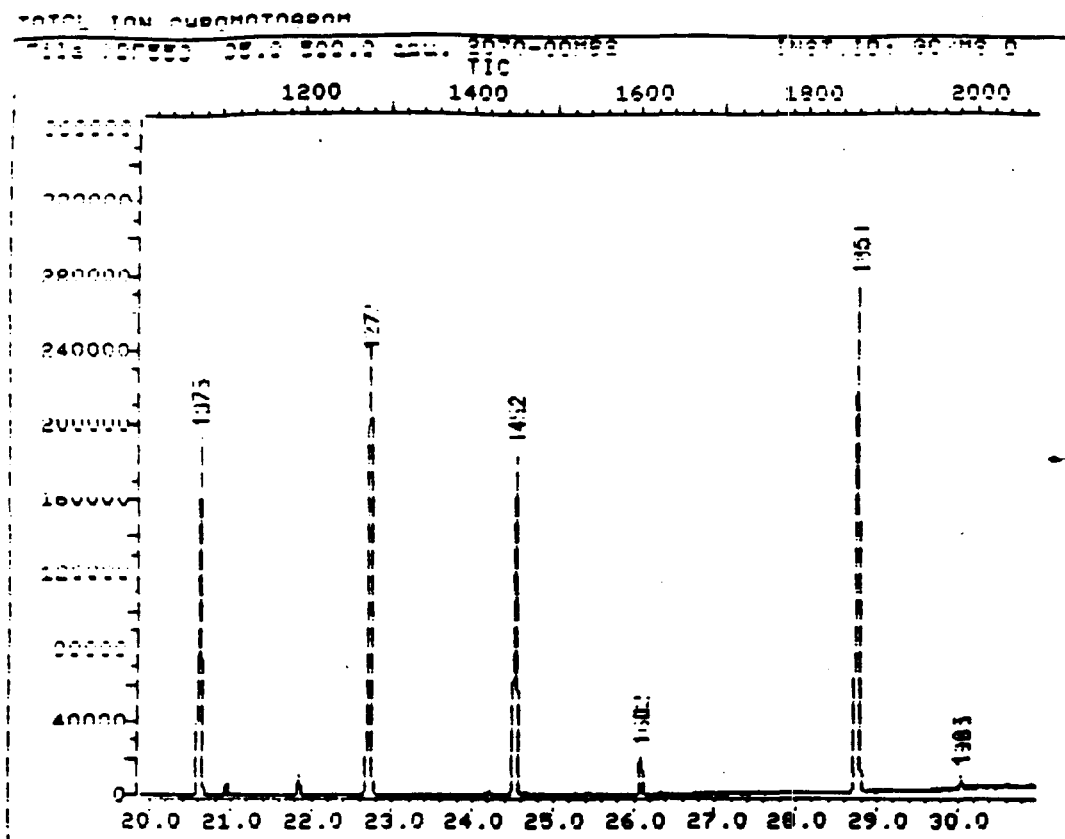
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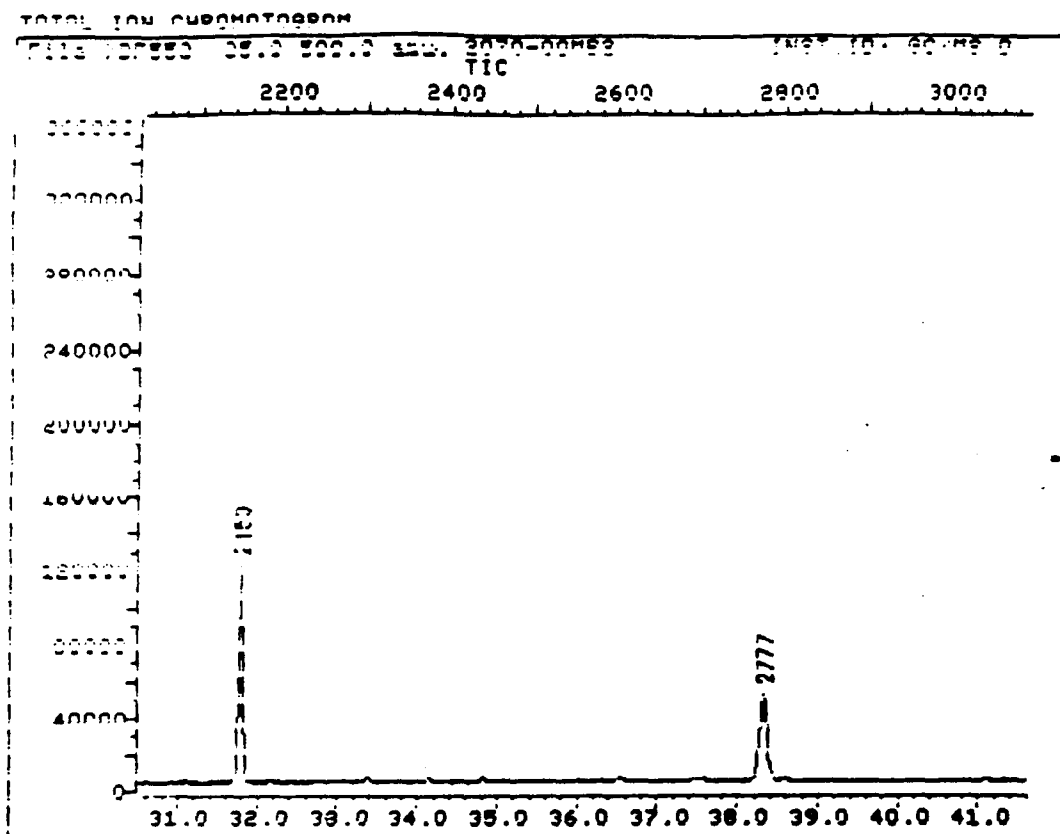
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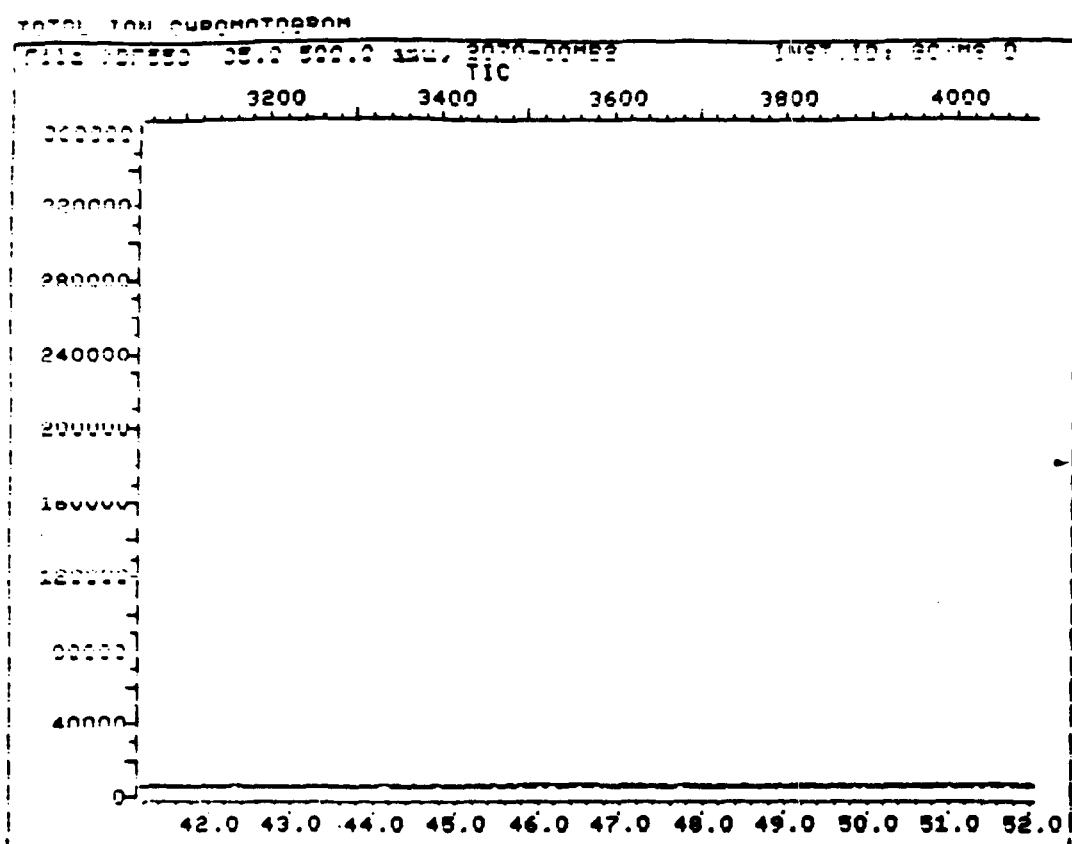
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Quant Output File: ^8F553::QT

BTL# 1

Id File: ID2EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891012 08:46

Operator ID: SHERRI  
Quant Time: 891012 11:43  
Injected at: 891012 10:48

TIC page 4 of 4

QUANT REPORT

Operator ID: SHERRI  
 Output File: \BKF553::QT  
 Data File: \BKF553::C4  
 Name: 2020-00MB2  
 Misc: INST ID: GC/MS 0

Quant Rev: 6 Quant Time: 891012 11:41  
 Injected at: 891012 10:48  
 Dilution Factor: 1.000000

Run # 1

ID File: 102FPA:ISM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891012 08:46

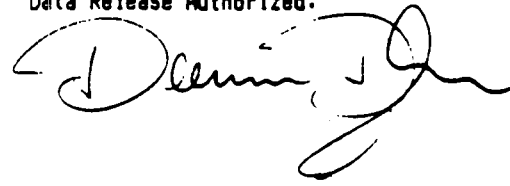
	Compound	Q	Ion	Scan#	Area	Conc	Units	g
10)	*C130	1,4-Dichlorobenzene-d4	152.0	312	43743	40.00	UG/mL	94
20)	C150	2-Fluorophenol	112.0	27	126726	116.15	UG/mL	87
30)	C145	Phenol-d5	99.0	234	227723	157.55	UG/mL	99
160)	*C140	Naphthalene-d8	136.0	625	177839	40.00	UG/mL	86
120)	C120	Nitrobenzene-d5	82.0	449	122637	63.73	UG/mL	96
220)	C130	Benzoic acid	122.0	552	1113	1.19	UG/mL	79
310)	*C150	Acenaphthene-d10	164.0	1075	109052	40.00	UG/mL	97
320)	C125	2-Fluorobiphenyl	172.0	901	218194	59.52	UG/mL	94
330)	C155	2,4,6-Tribromophenol	330.0	1277	76944	134.12	UG/mL	77
520)	*C160	Phenanthrene-d10	188.0	1452	198898	40.00	UG/mL	84
600)	C150	Di-n-butylphthalate	149.0	1602	25952	3.93	UG/mL	83
420)	*C170	Chrysene-d12	240.0	2150	129370	40.00	UG/mL	92
	C130	Terphenyl-d14	244.0	1859	282505	64.79	UG/mL	91
	C120	Butylbenzylphthalate	149.0	1983	4591	1.69	UG/mL	95
630)	C135	bis(2-Ethylhexyl)phthalate	149.0	2150	6215	1.86	UG/mL	92
200)	*C175	Perylene-d12	264.0	2777	107816	40.00	UG/mL	93

\* Compound is ISTD

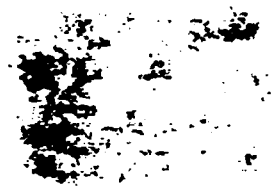
SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

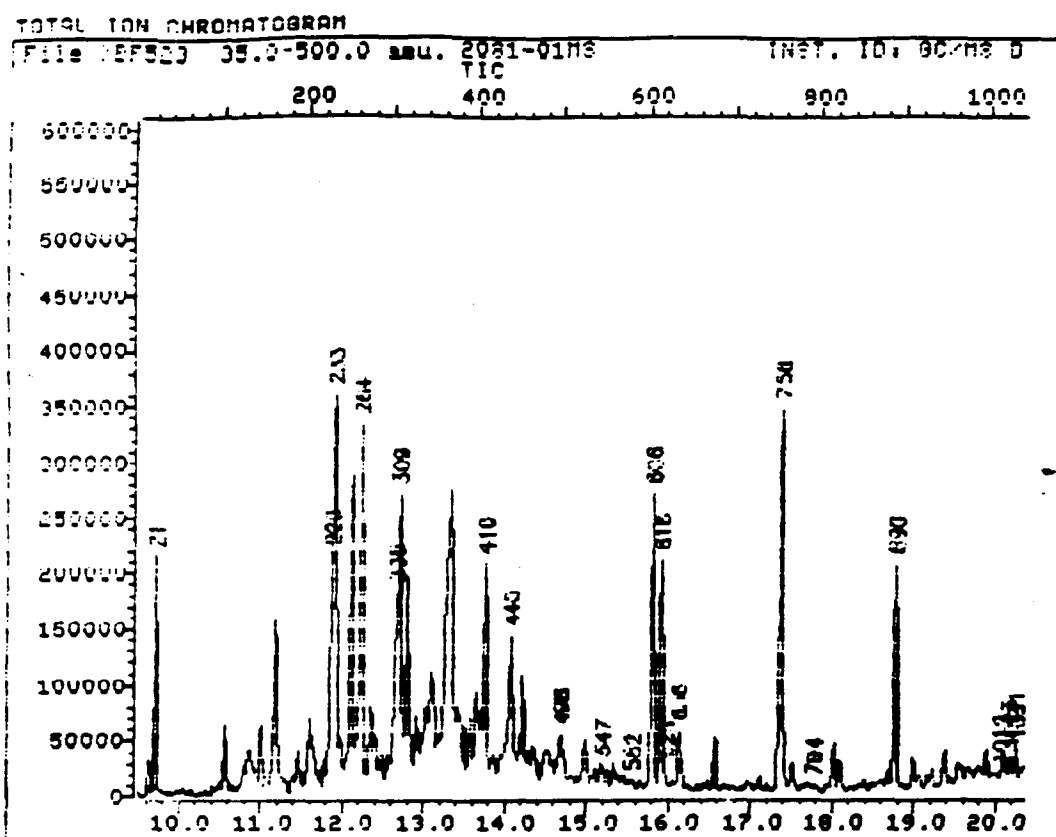
Laboratory Name: Pacific Northwest Environmental Lab.  
Project Number: 891005-10  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 1  
Sample wt/vol: 30g Percent Moisture: 24  
Date Extracted: 10/09/89  
Date Analyzed: 10/10/89

Lab Sample: 2081-01MS  
Customer Sample: T1-3-926-15MS  
Sample Description: Sand from Bottom of Pile  
Date Collected: 09/26/89  
Time Collected: NA  
Date Received: 10/06/89  
Data Release Authorized:



C.A.S. Number		UG/KG	
95-57-8	2-Chlorophenol	5300	*
120-83-2	2,4-Dichlorophenol	440	U
59-50-7	4-Chloro-3-methylphenol	5800	*
88-06-2	2,4,6-Trichlorophenol	440	U
95-95-4	2,4,5-Trichlorophenol	2200	U
87-86-5	Pentachlorophenol	9800	*





Data File: >BF523::D1

Quant Output File: ^BF523::QT

Name: 2081-01MS

Misc: INST. ID: GC/MS D

BTI. 6

Id File: ID2EPA::GM

Title: DAILY CALIBRATION STANDARD

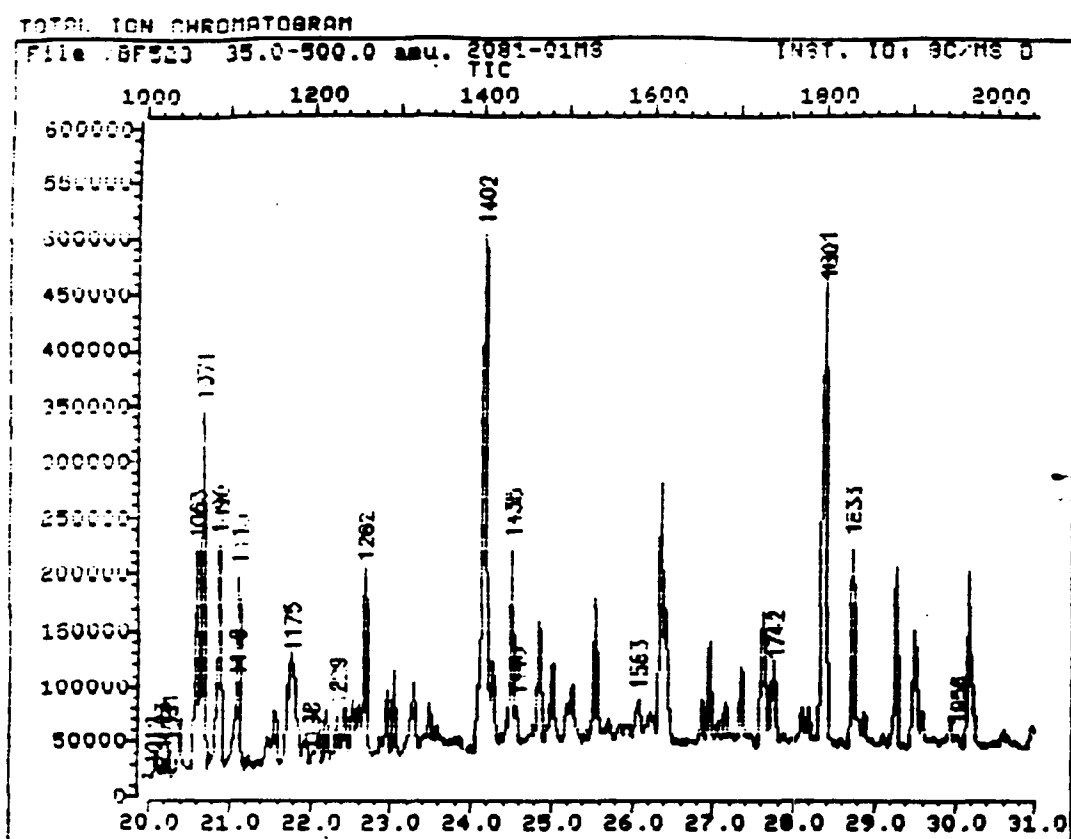
Last Calibration: 891010 09:42

Operator ID: SHERRI

Quant Time: 891010 17:48

Injected at: 891010 16:52

TIC page 1 of 1



Data File: >8F523::C1  
Name: 2081-01MS  
Misc: INST. ID: GC/MS D

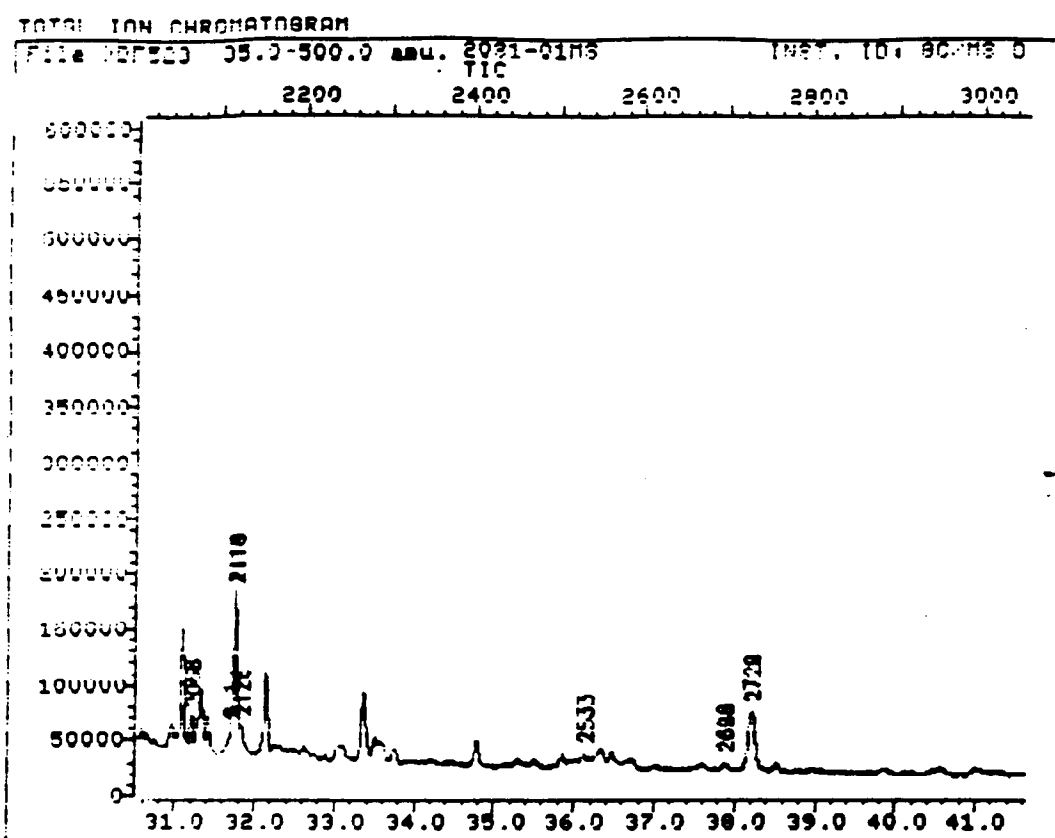
Quant Output File: ^8F523::QT

BIT # 6

Id File: 102EPA::IGM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: SHERRI  
Quant Time: 891010 17:48  
Injected at: 891010 16:52

TIC page 2 of 2



Data File: >BF523::C1

Quant Output File: ^BF523::QT

Name: 2021-01MS

Misc: INST. ID: GC/MS D

BTL# 6

Id File: ID2EPA::GM

Title: DAILY CALIBRATION STANDARD

Last Calibration: 891010 09:42

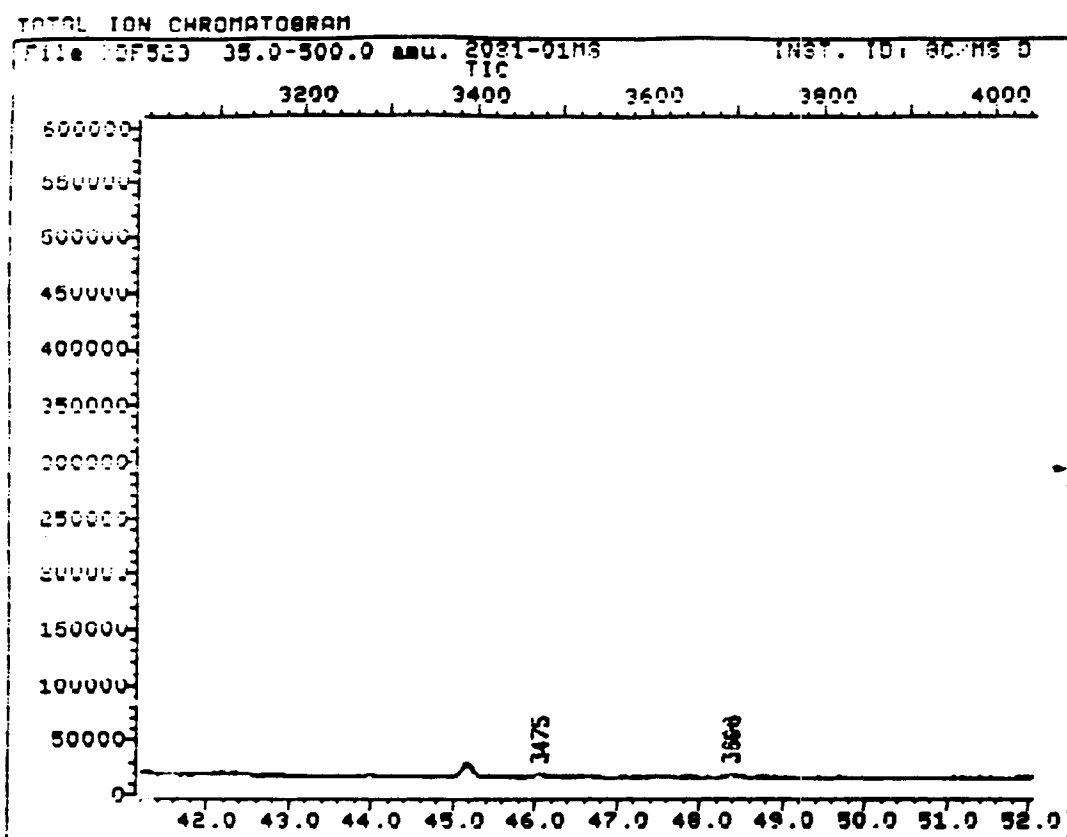
Operator ID: SHERRI

Quant Time: 891010 17:48

Injected at: 891010 16:52

TIC page 3 of 4





Data File: >8BF523::C1  
Name: 2021-01MS  
Misc: INST. ID: GC/MS D

Quant Output File: ^8BF523::QT

B/L# 6

Id File: ID2EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: SHERRI  
Quant Time: 891010 17:48  
Injected at: 891010 16:52

TIC page 4 of 4

# QUANT REPORT

Operator ID: SHERRI  
 Output File: \BF523:C3  
 Data File: \BF523:C1  
 Name: 2081-01MS  
 Misc: INST. ID: GC/MS D

Quant Rev: 6 Quant Time: 891010 17:48  
 Injected at: 891010 16:52  
 Dilution Factor: 1.000000

BIL# 6

ID File: 102EPA:IRM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891010 09:42

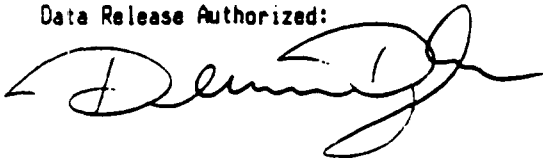
	Compound	Q	Ion	Scan#	Area	Conc	Units	n
1)	*C130 1,4-Dichlorobenzene-d4	152.0	305	47851	40.00	UG/mL	96	
2)	C550 2-Fluorophenol	112.0	21	118928	23.82	UG/mL	82	
3)	C545 Phenol-d5	99.0	229	141662	78.71	UG/mL	96	
4)	C515 Phenol	94.0	233	246052	108.04	UG/mL	95	
6)	C330 2-Chlorophenol	128.0	264	213802	120.78	UG/mL	87	
8)	C340 1,4-Dichlorobenzene	146.0	309	118664	65.12	UG/mL	99	
14)	C370 N-Nitroso-di-n-propylami	70.0	410	82322	52.52	UG/mL	85	
16)	*C140 Naphthalene-d8	136.0	616	188195	40.00	UG/mL	84	
17)	C520 Nitrobenzene-d5	82.0	440	76117	39.51	UG/mL	90	
22)	C430 Benzoic acid	122.0	547	3264	3.59	UG/mL	88	
3)	C445 1,2,4-Trichlorobenzene	180.0	606	131636	77.66	UG/mL	95	
	C465 4-Chloro-3-methylphenol	107.0	256	203014	132.64	UG/mL	74	
	*C150 Acenaphthene-d10	164.0	1063	119386	40.00	UG/mL	98	
2)	C525 2-Fluorobiphenyl	172.0	890	161688	40.84	UG/mL	94	
33)	C555 2,4,6-Tribromophenol	330.0	1262	64355	81.15	UG/mL	69	
42)	C550 Acenaphthene	153.0	1071	243074	65.68	UG/mL	97	
44)	C560 4-Nitrophenol	109.0	1090	61829	144.05	UG/mL	78	
46)	C570 2,4-Dinitrotoluene	165.0	1113	113870	91.96	UG/mL	66	
47)	C543 2,6-Dinitrotoluene	165.0	1016	4231M	4.14	UG/mL	69	
52)	*C160 Phenanthrene-d10	188.0	1435	207382	40.00	UG/mL	80	
57)	C635 Pentachlorophenol	266.0	1402	184074	222.83	UG/mL	97	
58)	C640 Phenanthrene	178.0	1440	36729	6.59	UG/mL	94	
60)	C650 Di-n-butylphthalate	149.0	1583	34737	5.07	UG/mL	84	
61)	C655 Fluoranthene	202.0	1742	59826	10.10	UG/mL	92	
62)	*C170 Chrysene-d12	240.0	2118	147498	40.00	UG/mL	90	
63)	C530 Terphenyl-d14	244.0	1833	191879	38.62	UG/mL	87	
64)	C715 Pyrene	202.0	1801	461362	66.66	UG/mL	91	
67)	C730 Benzo(a)anthracene	228.0	2113	12757	2.43	UG/mL	84	
68)	C735 bis(2-Ethylhexyl)phthala	149.0	2119	20264	5.35	UG/mL	94	
69)	C740 Chrysene	228.0	2126	21138	4.26	UG/mL	88	
70)	*C175 Perylene-d12	264.0	2729	122579	40.00	UG/mL	91	
72)	C765 Benzo(b)fluoranthene	252.0	2533	14592	3.28	UG/mL	83	
73)	C770 Benzo(k)fluoranthene	252.0	2540	11717M	3.34	UG/mL	83	
74)	C775 Benzo(a)pyrene	252.0	2698	11758	3.16	UG/mL	77	
75)	C780 Indeno(1,2,3-cd)pyrene	276.0	3475	9622	2.49	UG/mL	92	
77)	C790 Benzo(g,h,i)perylene	276.0	3696	11087M	3.44	UG/mL	84	

Compound is ISTD

SEMI VOLATILE  
ORGANICS ANALYSIS DATA SHEET

Laboratory Name: Pacific Northwest Environmental Lab.  
Project Number: 891005-10  
Sample Matrix: Soil  
Concentration: Low Dilution Factor: 1  
Sample wt/vol: 30g Percent Moisture: 24  
Date Extracted: 10/09/89  
Date Analyzed: 10/10/89

Lab Sample: 2081-01MSD  
Customer Sample: T1-3-926-15MSD  
Sample Description: Sand from Bottom of Pile  
Date Collected: 09/26/89  
Time Collected: NA  
Date Received: 10/06/89  
Data Release Authorized:



C.A.S.  
Number

UG/KG

95-57-8	2-Chlorophenol	4900	*
120-83-2	2,4-Dichlorophenol	440	U
59-50-7	4-Chloro-3-methylphenol	5700	*
88-06-2	2,4,6-Trichlorophenol	440	U
95-95-4	2,4,5-Trichlorophenol	2200	U
87-86-5	Pentachlorophenol	8900	*



# QUANT REPORT

Operator ID: SHERRI  
 Output File: ^BF524::C3  
 Data File: ^BF524::C1  
 Name: 2081-01MSD  
 Misc: INSTR. ID: GC/MS D

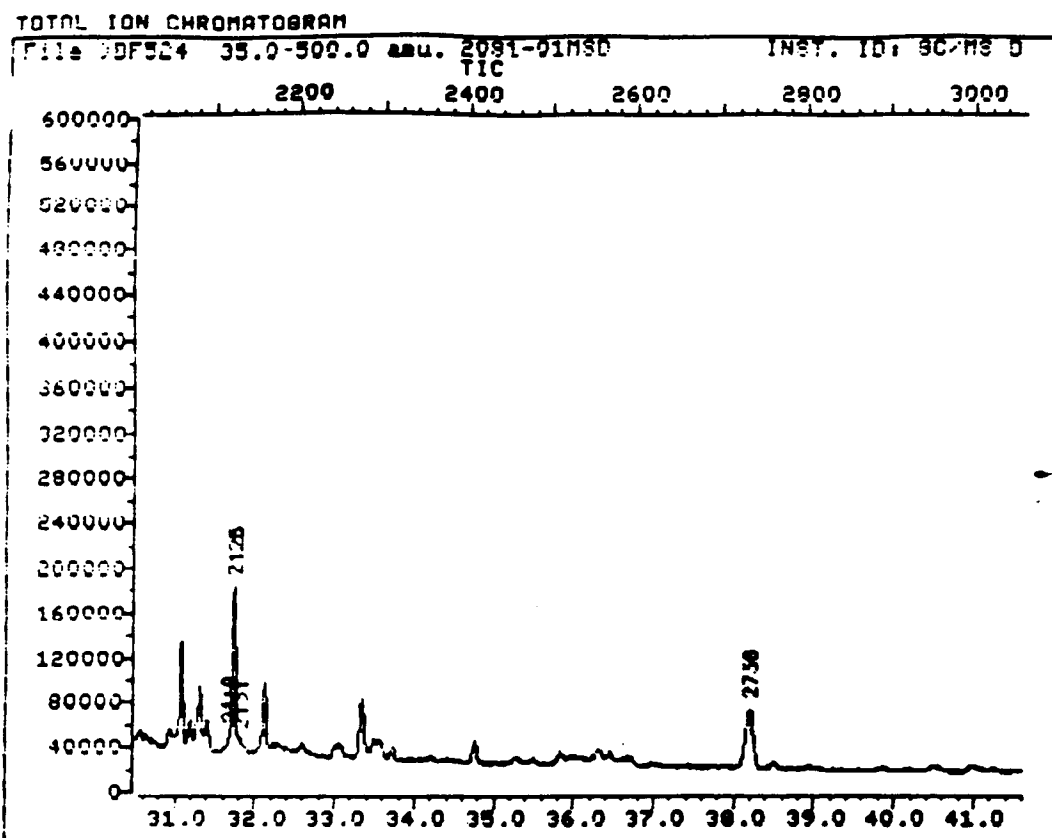
Quant Rev: 6 Quant Time: 891010 18:50  
 Injected at: 891010 17:54  
 Dilution Factor: 1.000000

BTL# 7

ID File: ID2FPA::RM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891010 09:42

	Compound	Q	Ion	Scan#	Area	Conc	Units	q
1)	*C130 1,4-Dichlorobenzene-d4	152.0		310	53631	40.00	UG/mL	94
2)	C150 2-Fluorophenol	112.0		27	120258	66.60	UG/mL	99
3)	CS45 Phenol-d5	99.0		234	146065	72.41	UG/mL	94
4)	C115 Phenol	94.0		238	252401	98.88	UG/mL	97
6)	C130 2-Chlorophenol	128.0		269	220809	111.30	UG/mL	87
8)	C140 1,4-Dichlorobenzene	146.0		314	119277	58.40	UG/mL	98
14)	C170 N-Nitroso-di-n-propylami	70.0		415	92211	57.49	UG/mL	88
16)	*C140 Naphthalene-d8	136.0		622	211606	40.00	UG/mL	85
17)	CS20 Nitrobenzene-d5	82.0		445	76295	35.22	UG/mL	91
22)	C430 Benzoic acid	122.0		553	5519	5.39	UG/mL	95
5)	C445 1,2,4-Trichlorobenzene	180.0		611	137508	72.15	UG/mL	97
	C465 4-Chloro-3-methylphenol	107.0		761	223170	129.68	UG/mL	73
1)	*C150 Acenaphthene-d10	164.0		1069	134195	40.00	UG/mL	99
	CS25 2-Fluorobiphenyl	172.0		895	171181	38.47	UG/mL	95
2)	CS55 2,4,6-Tribromophenol	330.0		1268	69113	77.53	UG/mL	73
42)	C550 Acenaphthene	153.0		1077	264178	63.50	UG/mL	97
44)	C560 4-Nitrophenol	109.0		1096	68248	141.46	UG/mL	80
46)	C570 2,4-Dinitrotoluene	165.0		1119	122482	87.99	UG/mL	69
47)	C543 2,6-Dinitrotoluene	165.0		1018	3724M	3.24	UG/mL	71
52)	*C160 Phenanthrene-d10	188.0		1440	226756	40.00	UG/mL	99
57)	C635 Pentachlorophenol	266.0		1408	184277	204.04	UG/mL	96
60)	C650 Di-n-butylphthalate	149.0		1588	19092	2.55	UG/mL	85
61)	C655 Fluoranthene	202.0		1748	7774	1.20	UG/mL	92
62)	*C170 Chrysene-d12	240.0		2125	149091	40.00	UG/mL	93
63)	CS30 Terphenyl-d14	244.0		1839	184987	36.84	UG/mL	87
64)	C715 Pyrene	202.0		1806	416801	59.58	UG/mL	90
68)	C735 bis(2-(4-hexyl)phthala	149.0		2125	25750	6.72	UG/mL	93
70)	*C175 Perylene-d12	264.0		2736	123495	40.00	UG/mL	91

\* Compound is ISTD



Data File: >8BF524::C1  
Name: 2081-01MSD  
Misc: INST. ID: GC/MS D

Quant Output File: ^8BF524::QT

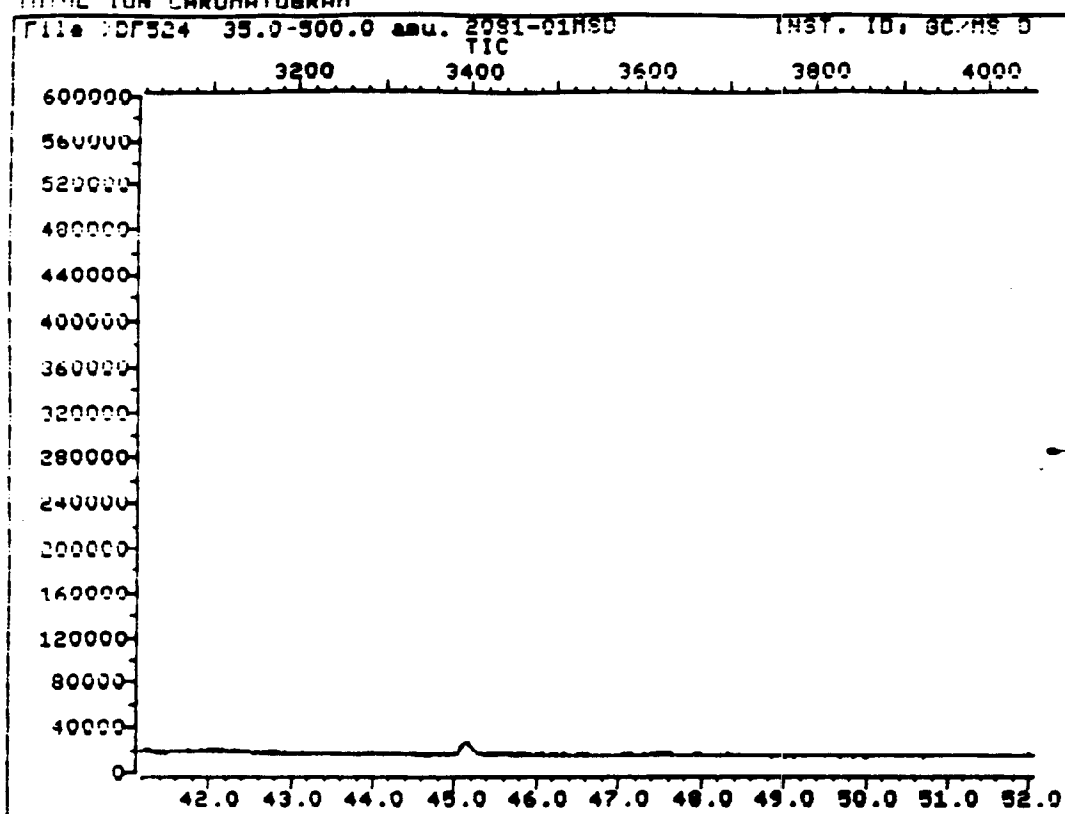
BTL# 7

Id File: ID2EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: SHERRI  
Quant Time: 891010 18:50  
Injected at: 891010 17:54

TIC page 3 of 4

## TOTAL ION CHROMATOGRAM



Data File: &gt;8F524::C1

Quant Output File: ^8F524::QT

Name: 2081-01MSD

Misc: INST. ID: GC/MS D

BTL# 7

Id File: ID2EPA::GM

Title: DAILY CALIBRATION STANDARD

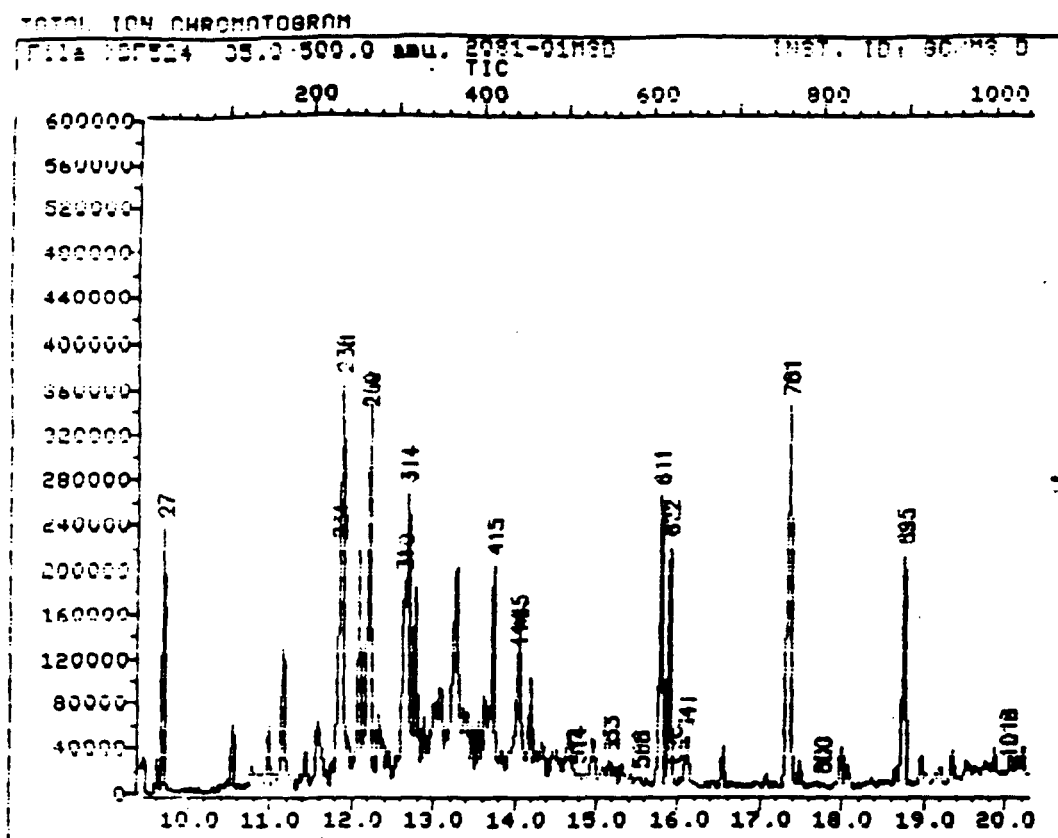
Last Calibration: 891010 09:42

Operator ID: SHERRI

Quant Time: 891010 18:50

Injected at: 891010 17:54

TIC page 4



Data File: >BF524::C1  
 Name: 2081-01MSD  
 Misc: INST. ID: GC/MS D

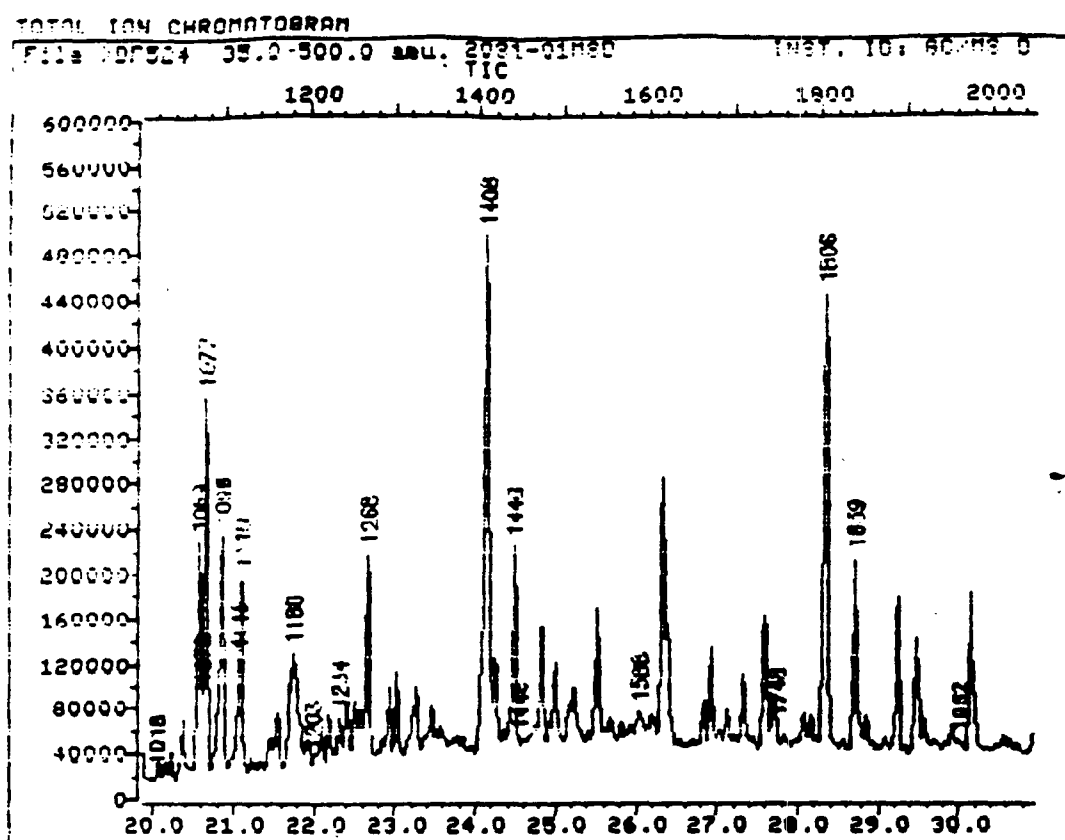
Quant Output File: ^BF524::QT

BTL# 7

Id File: ID2EPA::GM  
 Title: DAILY CALIBRATION STANDARD  
 Last Calibration: 891010 09:42

Operator ID: SHERRI  
 Quant Time: 891010 18:50  
 Injected at: 891010 17:54

TIC page 1 of 4



Data File: >BF524::C1  
Name: 2081-01MSD  
Misc: INST. ID: GC/MS D

Quant Output File: ^BF524::QT

BTLE 7

Id File: ID2EPA::GM  
Title: DAILY CALIBRATION STANDARD  
Last Calibration: 891010 09:42

Operator ID: SHERRI  
Quant Time: 891010 18:50  
Injected at: 891010 17:54

TIC page 2 of 2



— TIME OIL CO.  
SANITARY SEWER INFO.

(2)

Address 12005 N. Burgard Permit 0223177  
Lot \_\_\_\_\_ Blk \_\_\_\_\_ Add \_\_\_\_\_ **ENTER ST**  
Owner Schnitzer Inv/  
Contractor Dean Warren Plumbing  
Stories and class of building New 1 story Warehouse office  
Water Closets 13N Hot-Water Tank 5N Cesspool \_\_\_\_\_  
Bath, Shower 5N Auto. Cl. Washer \_\_\_\_\_ Conn. Cesspool \_\_\_\_\_  
Bath Tub \_\_\_\_\_ Auto. Dishwasher \_\_\_\_\_ Dry Well \_\_\_\_\_  
Basins 11N Drain Floor 8N Conn. Drywell \_\_\_\_\_  
Sinks 3N Drain Area \_\_\_\_\_ Conn. Sewer 10' 1N  
Laundry Trays \_\_\_\_\_ Rain Drains Fountains 5N Storm Sewer \_\_\_\_\_  
Bldg. Pmt. \_\_\_\_\_ Urinals 6N Catch-Basins \_\_\_\_\_  
Water Ser. \_\_\_\_\_  
Remarks Storm & Sanitary was permitted & completed  
thru Multnomah County Permit #35314  
Date of First Inspection \_\_\_\_\_ Date of Final Inspection \_\_\_\_\_  
Inspector \_\_\_\_\_ Inspector \_\_\_\_\_



1819

FORM W 271-1  
(2-68)CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS

## SEWER BRANCH

Pmt. No. 94947

Date 1-10-74

Location 12005 N Burgard Road

Between

Addition Sec. 35 T2N R1W WM Lot (29) por of Bk.

Applicant A J Zinda Waiver No ☒ Yes ☐ #Remarks 617'± of 12" & 8" CSP from stub out of city  
manhole east of property (private) sampling man-  
hole on property no inspection called for but  
inspected by county plumbing inspector

SANITARY ONLY SEWER

Inspected 1-15-74 19 By

Book 9 Page 147 New x Repair

NOT ENTERED SEWER BOOK 8.77

DEPARTMENT OF PUBLIC WORKS CITY OF LOS ANGELES  
SEWER CONNECTION MAP

Type of sewer  
☐ Storm  
☐ State Highway Dept.  
☐ Water  
☐ Combined Storm & Sanitary at 12 in. line  
☐ P.C. Waste Water Separation

Sanitary  
☐ County  
☐ Easement

Combined  
☐ County  
☐ Easement

Scale 1" = 100'

1919

1040

1719-1819  
FORM W 271-1  
(2-68)

CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS

Pmt. No. 92355  
92422

SEWER BRANCH

Date 1-14-72

Location 12005 N Burgard Road  
Between  
Addition Sec. 35 T2N R1W WM T Lot (38) Blk.  
Applicant Harder Mech. Waiver No ☐ Yes ☐ #  
Remarks 12x8 CSP wye to existing stub out of manhole  
9' deep 6" CSP into property sampling manhole  
on property

~~SANITARY-ONLY SEWER~~

Inspected 1-13-72 10 By Brooks

Book 9 Page 147 New Repair  
~~NOT~~ ENTERED SEWER BOOK 471



1719 S.W.  
FORM W 271-1  
(4-69)

**SANITARY ONLY SEWER**  
CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS  
BUREAU OF DESIGN  
SEWER BRANCH

Pmt. No. 92355

Date 10-25-72

Location 12005 N. Burgard Rd.

Between

Addition Sec 35, 2N, 1W

Lot T.L. '18' Blk.

Applicant Harder Mech.

Waiver No ☐ Yes ☐ #

Remarks 6" transite pipe to existing 8" stub in manhole.  
Sampling manhole on property.

Inspected 10-25-72 19 By Brooks

Book 9 Page 148 New ☒ Repair





1820  
FORM W 271-1  
(2-68)

CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS

Pmt. No. 88159

SANITARY <sup>BUREAU OF DESIGN</sup> ~~ONLY~~ SEWER  
SEWER BRANCH

Date 12-10-69

Location 12005 N Burgard Rd

Between

Addition 72N RIW WM

Lot Sec 35

Blk TL

524091  
434647

Applicant Beall Pipe & Tank Corp. Waiver No ☐ Yes ☐ #

Remarks 10" C.S.P. to existing branch out of M.H.  
Old sump made into sampling M.H.  
Investigation only

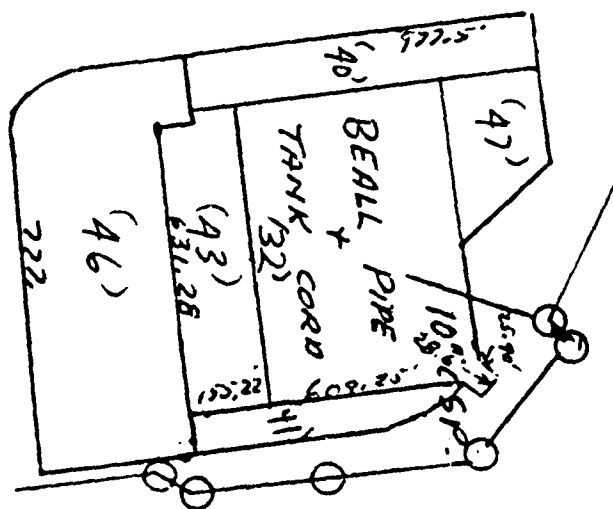
Inspected Roy Yonge 19 By 12-9-69

Book N.I.B.

Page

New

Repair



PLAN

SAC. 35, 2N110

1819  
FORM W 271:1  
(4-69)

SANITARY ONLY SEWER  
CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS  
BUREAU OF DESIGN  
SEWER BRANCH

Pmt. No. 88068-9-70

Date Nov 3, 69

Location 12005 N Burford Rd (Plote Shop)

Between

Addition Sec 35, 2N, 1W Lot 7L 29' Blk.

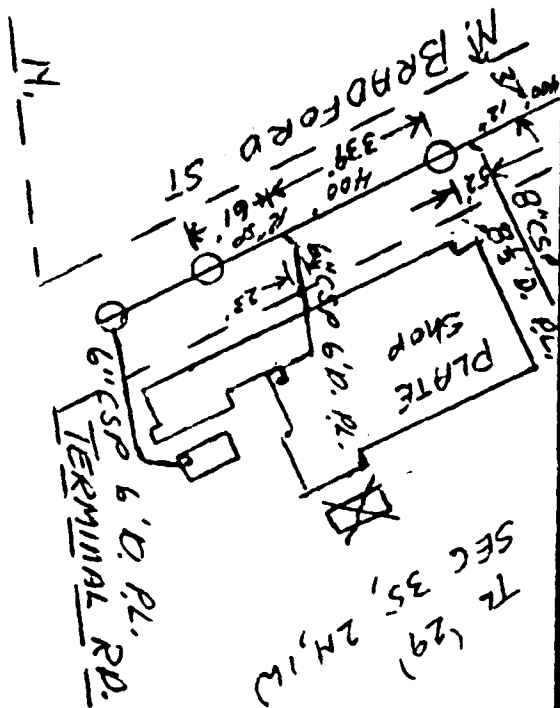
Applicant Broadway Holding Co. Waiver No ☐ Yes ☐ #

Remarks #88068 - 8" CSP To EXISTING wye in New Sewer 52' Northw. of MH at N End of Shop at 340' S of MH North of Building. 0.5' deep at Prop. line. #88069 - Branch Angles on Approx 45° from wye to prop. 6" CSP To EXISTING 339' S of MH at N End of Building 7' deep at Prop. line. #88070 - 6" CSP To exist. stub in MH 6' deep

Inspected Nov 14 1969 By Brooks at Prop. line

Book 9 Page 155 New ☒ Repair

SANITARY ONLY SEWER



1819

FORM W 271-1  
(4-69)

## SANITARY ONLY SEWER

CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS  
BUREAU OF DESIGN  
SEWER BRANCH

Pmt. No. 88067

Date 11-3-69

Location 12005 N. Burgard Rd.

Between Nr. N Bradford

Addition Sec. 35, 2N, 1W; Tax Lot '29' Blk. --

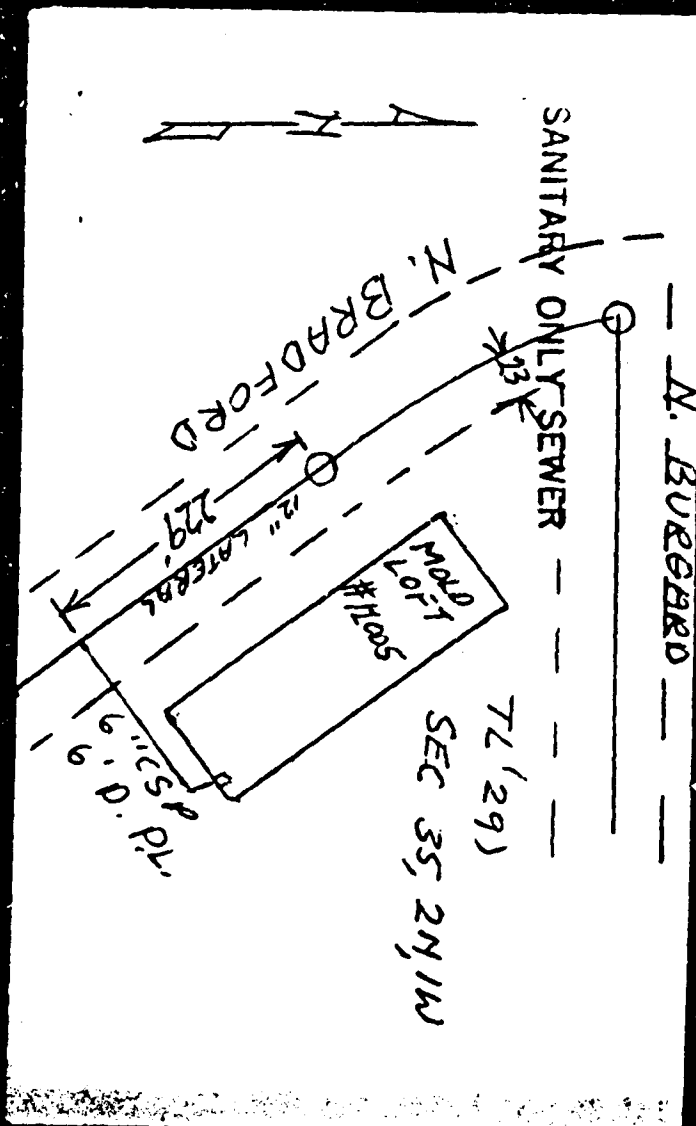
Applicant Broadway Holding Co. Waiver No ☐ Yes ☐ #

Remarks

6" CSP to exist. Y 229' Southerly of MH  
in front of prop. 6" at PL. San. only.

Inspected 11-13 19 69 By Alex Haberman

Book 9 Page 140 New Repair



18.20 SANITARY ONLY SEWER

FORM W 271.1  
(4-69)

CITY OF PORTLAND, OREGON  
DEPARTMENT OF PUBLIC WORKS  
BUREAU OF DESIGN  
SEWER BRANCH

Pmt. No. 88071

Date 11-3-69

Location 12005 N. Burgard Rd.

Between

Addition Sec. 35, 2N, 1W; Tax Lot '37' Blk. -

Applicant Broadway Holding Co. Waiver No ☐ Yes ☐ #

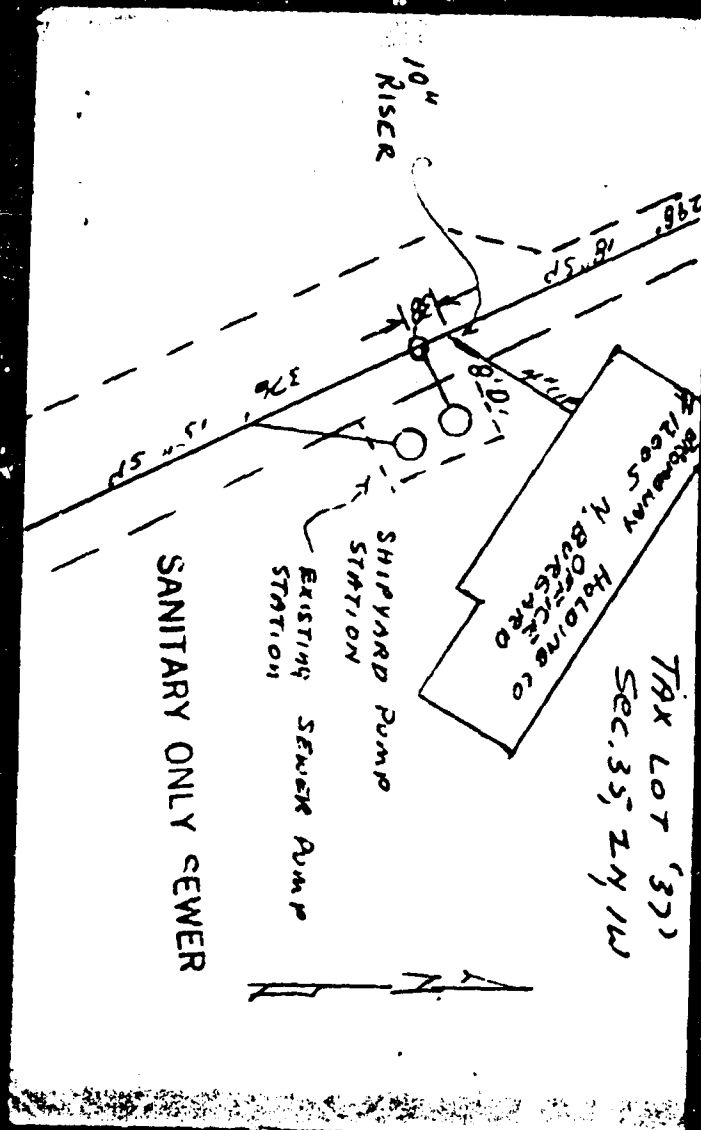
Remarks

Recon. 3 pc. 10" CSP from riser to exist.  
4" CIP 38' N'ly of MH nr. shipyard pump sta. 8'  
deep con. made by Montag & insp. by A. Haberman.

Inspected 19 By

Book 9 Page 146 New ☒ Repair





1819 SANITARY ONLY SEWER  
CITY OF PORTLAND, OREGON  
FORM W 271-1 (4-67) DEPARTMENT OF PUBLIC WORKS  
BUREAU OF DESIGN  
SEWER BRANCH

Pmt. No. 87416  
Date June 26, 1969

Location 12005 N. Burgard Rd. (Container Corp. of Am.)  
Between  
Addition TL 33, Sec. 35, 2N1W. Lot Blk.  
Applicant Lord Bros. Cont. Waiver No ☐ Yes ☐ #  
Remarks 12" CSP Private Sewer Conn. to stub out of  
MH approximately 10' deept. No insp. called for  
Connection made around Oct. 1st.

Inspected 19 By  
Book 9 Page 147 New ☒ Repair

# 12005 IV BUREAU RD

CONTINER  
CORP.  
OF AMERICA (33)

SEC. 35 24 14

12" PRIVATE SAN. CUMH  
CSP

10' D. 5A

SANITARY ONLY SEWER

ASSEMBLY



DATE: 24 MAY 84

LAB #: 94-8326

ITEM #: 1

SAMPLE: #1

LEGAL

4/9

ACID EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<10	PHENOL	<10	2,4,6-TRICHLOROPHENOL
<10	2-CHLOROPHENOL	<10	2,4-DINITROPHENOL
<10	2-NITROPHENOL	<10	4-NITROPHENOL
<10	2,4-DIMETHYLPHENOL	<10	2-METHYL-4,6-DINITROPHENOL
<10	2,4-DICHLOROPHENOL	170	PENTACHLOROPHENOL
<10	4-CHLORO-3-METHYLPHENOL	<10	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<10	BIS(2-CHLOROETHYL) ETHER	910	ACENAPHTHENE
<10	1,3-DICHLOROBENZENE	<10	2,4-DINITROTOLUENE
<10	1,4-DICHLOROBENZENE	2300	FLUORENE
<10	1,2-DICHLOROBENZENE	<10	DIETHYLPHTHALATE
<10	HEXACHLOROETHANE	<10	N-NITROSODIPHENYLAMINE
<10	N-NITROSO-DI-N-PROPYLAMINE	<10	4-BROMOPHENYL PHENYL ETHER
<10	NITROBENZENE	<10	HEXACHLOROBENZENE
<10	ISOPHORONE	4600	PHENANTHRENE
<10	BIS(2-CHLOROETHOXY) METHANE	9100	ANTHRACENE
<10	1,2,4-TRICHLOROBENZENE	<10	DIBUTYL PHTHALATE
1300	NAPHTHALENE	910	FLUORANTHENE
<10	HEXACHLOROBUTADIENE	550	PYRENE
<10	HEXACHLOROCYCLOPENTADIENE	<10	BUTYL BENZYL PHTHALATE
<10	2-CHLORONAPHTHALENE	160	BENZ(A)ANTHRACENE
<10	ACENAPHTHYLENE	630	CHRYSENE
<10	DIMETHYLPHTHALATE	<10	3,3'-DICHLOROBENZIDINE
<10	2,6-DINITROTOLUENE	<10	BIS(2-ETHYLHEXYL) PHTHALATE
		90	BENZ(A)PYRENE

DATE: 24 MAY 84

LAB #: 84-0326

ITEM #: 1

SAMPLE: #1

LEGAL

7/9

PESTICIDES  
METHOD 625

=====

AMOUNT	PARAMETER
MG/KG	

=====

<50	ALPHA-BHC
<50	HEPTACHLOR
<50	ALDRIN
<50	HEPTACHLOR EPOXIDE
<50	ENDOSULFAN I
<50	TRANS-NONACHLOR
<50	P,P'-DDE
<50	DIELDRIN
<50	ENDRIN
<50	ENDOSULFAN II
<50	P,P'-DDD
<50	ENDOSULFAN CYCLIC SULFATE
<50	P,P'-DDT
<50	GAMMA-BHC (LINDANE)

LEGAL

319

DATE: 24 MAY 84

LAB #: 84-0326

ITEM #: 2

SAMPLE: #2

PESTICIDES  
METHOD 625

=====

AMOUNT	PARAMETER
MG/KG	

=====

<50	ALPHA-BHC
<50	HEPTACHLOR
<50	ALDRIN
<50	HEPTACHLOR EPOXIDE
<50	ENDOSULFAN I
<50	TRANS-NONACHLOR
<50	P,P'-DDE
<50	DIELDRIN
<50	ENDRIN
<50	ENDOSULFAN II
<50	P,P'-DDD
<50	ENDOSULFAN CYCLIC SULFATE
<50	P,P'-DDT
<50	GAMMA-BHC (LINDANE)

DATE: 24 MAY 84

LAB #: 84-0326

ITEM #: 2

SAMPLE: #2

LEGAL

2/9

ACID EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<10	PHENOL	<10	2,4,6-TRICHLOROPHENOL
<10	2-CHLOROPHENOL	<10	2,4-DINITROPHENOL
<10	2-NITROPHENOL	<10	4-NITROPHENOL
<10	2,4-DIMETHYLPHENOL	<10	2-METHYL-4,6-DINITROPHENOL
<10	2,4-DICHLOROPHENOL	<10	PENTACHLOROPHENOL
<10	4-CHLORO-3-METHYLPHENOL	<10	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOLBASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<10	BIS(2-CHLOROETHYL) ETHER	50	ACENAPHTHENE
<10	1,3-DICHLOROBENZENE	<10	2,4-DINITROTOLUENE
<10	1,4-DICHLOROBENZENE	80	FLUORENE
<10	1,2-DICHLOROBENZENE	<10	DIETHYLPHTHALATE
<10	HEXACHLOROETHANE	<10	N-NITROSODIPHENYLAMINE
<10	N-NITROSO-DI-N-PROPYLAMINE	<10	4-BROMOPHENYL PHENYL ETHER
<10	NITROBENZENE	<10	HEXACHLOROBENZENE
<10	ISOPHORDNE	200	PHENANTHRENE
<10	BIS(2-CHLOROETHOXY) METHANE	200	ANTHRACENE
<10	1,2,4-TRICHLOROBENZENE	<10	DIBUTYL PHTHALATE
100	NAPHTHALENE	80	FLUORANTHENE
<10	HEXACHLOROBUTADIENE	50	PYRENE
<10	HEXACHLOROCYCLOPENTADIENE	<10	BUTYL BENZYL PHTHALATE
<10	2-CHLORONAPHTHALENE	<10	BENZ(A)ANTHRACENE
<10	ACENAPHTHYLENE	<10	CHRYSENE
<10	DIMETHYLPHTHALATE	<10	3,3'-DICHLOROBENZIDINE
<10	2,6-DINITROTOLUENE	<10	BIS(2-ETHYLHEXYL) PHTHALATE
		<10	BENZ(A)PYRENE



# LEGAL

9/9

23 MAY 84

GC/MS SCAN ID

DJH

84-0326 #1

IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE FOLLOWING COMPOUNDS WERE OBSERVED AT THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
UNDECANE	290
DODECANE	530
TRIDECANE	2400
2-METHYL NAPHTHALENE	650
1,1'-BIPHENYL	400
TETRADECANE	1100
1,8-DIMETHYL NAPHTHALENE	580
2,6,10,14-TETRAMETHYL HEPTADECANE	320
PENTADECANE	750
2-(1-METHYLETHYL) NAPHTHALENE	160
DIBENZOFURAN	1600
HEPTADECANE	620
DIBENZOTHIOPHENE	400
OCTADECANE	5800
CARBAZOLE	3100
NONADECANE	370
3-METHYL PHENANTHRENE	150
EICOSANE	260

# LEGAL

5/1

23 MAY 84

GC/MS SCAN ID

DGH

84-0326 #2

IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE FOLLOWING COMPOUNDS WERE OBSERVED AT THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
TETRADECANE	40
HEPTADECANE	100
2,6,10,14-TETRAMETHYL PENTADECANE	30

DATE: 04 MAY 84

LEGAL

8/4

LAB #: 84-0326

ITEM #: 1

SAMPLE: #1

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
MG/KG	

=====

1206	PCB GROUP 1
127	PCB GROUP 2
24	PCB GROUP 3
1357	TOTAL PCB

PCB GROUP 1 INCLUDES PCB'S 1221, 1232,  
1242 AND IS CALCULATED AS 1242.  
PCB GROUP 2 INCLUDES PCB'S 1248, 1254  
AND IS CALCULATED AS 1254.  
PCB GROUP 3 INCLUDES PCB'S 1260, 1262  
AND IS CALCULATED AS 1260.

DATE: 04 MAY 84

LEGAL

4/9

LAB #: 84-0326 *12K*  
ITEM #: 2  
SAMPLE: #2

PCB'S  
METHOD 608

=====  
AMOUNT            PARAMETER  
MG/KG  
=====

47.4	PCB GROUP 1
9.7	PCB GROUP 2
2.6	PCB GROUP 3
59.7	TOTAL PCB

PCB GROUP 1 INCLUDES PCB'S 1221, 1232,  
1242 AND IS CALCULATED AS 1242.  
PCB GROUP 2 INCLUDES PCB'S 1248, 1254  
AND IS CALCULATED AS 1254.  
PCB GROUP 3 INCLUDES PCB'S 1260, 1262  
AND IS CALCULATED AS 1260.

Copied:  
F. B. Gifford  
G. Baesler

Analysis Completed: May 17 1994

Item No.

Test Results (All units in  $\frac{\text{mg}}{\text{kg dry wt}}$  or  $\text{mg/m}^3$ )

[illegible]

Comments: item #1 oily sludge

# LEGAL

DEPARTMENT OF ENVIRONMENTAL QUALITY  
Request for Analysis

NEW 9.50 11:00 0.1

Laboratory No. 84-0326

Location/Site: Time Oil Date: May 2, 1984 1000

Date Received Lab: MAY 02 1984 1100

Collected By: RFG, BHW, BR Program: HW 42-88

Date Reported: MAY 31 1984

Purpose: Complaint follow up w/ Malt Co. shared

Report Data To: \_\_\_\_\_

Comments: \_\_\_\_\_

lab prepared

\* Basic (P) unpreserved; Nutrient (R) add H<sub>2</sub>SO<sub>4</sub> in field; Metals (Tm) HNO<sub>3</sub> added in lab--don't rinse; Organic(X) mason jar

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s				Test Required
		Nutrients	DO	Metals		
		Basic	BOD	Organic		
1	SLUDGE ON SURFACE — 4' FROM EDGE OF TANK ENTRY HOLE			#1		PCB's, Pb, %M. Priority Pollutants (Organics) GC-MS acids/BN
2	SOIL — 10' FROM TANK 6-7 INCHES BELOW SURFACE			#2		"
3						
4						
5						
6						

Solid Waste Division  
Dept. of Environmental Quality  
**RECEIVED**  
JUL 6 1984

Laboratory comments #1 oily sludge

DATE: 02 JAN 84

LAB #: 84-1020

ITEM #: 2

SAMPLE: Z1007

LEGAL

5/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

MULT  
3074

Start Card # 43099

(2) TYPE OF WORK:

<input checked="" type="checkbox"/> New construction	<input type="checkbox"/> Repair	<input type="checkbox"/> Recondition
<input type="checkbox"/> Conversion	<input type="checkbox"/> Deepening	<input type="checkbox"/> Abandonment

(3) DRILLING METHOD

☐ Rotary Air      ☐ Rotary Mud      ☐ Cable

☒ Hollow Stem Auger      ☐ Other \_\_\_\_\_

(4) BORE HOLE CONSTRUCTION

Special Standards      Yes    No      Depth of completed well 30 ft.

(6) LOCATION OF WELL By legal description

Well Location: County MULTNOMAH  
Township 1 (N or S) Range 1 (E or W) Section 11  
1. SW 1/4 of SE 1/4 of above section.  
2. Street address of well location 3700 S.E. 17TH AVE  
PORTLAND, OR.  
3. Tax lot number of well location 5, 7, 8  
4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL: 17 Ft. below land surface. Date 6/3/92  
Artesian Pressure \_\_\_\_\_ lb/sq. in. Date \_\_\_\_\_

(8) **WATER BEARING ZONES:**  
Depth at which water was first found 17'

From	To	Est. Flow Rate	SWL

[illegible]

Land surface

Vault  
0 ft.  
TO  
1 ft.

Water-tight cover

Surface flush vault

Locking cap

Casing  
diameter 4 in.  
material PVC  
Welded Threaded Glued  
☐ ☒ ☐  
Liner  
diameter \_\_\_\_\_ in.  
material \_\_\_\_\_  
Welded Threaded Glued  
☐ ☐ ☐

Seal  
0 ft.  
TO  
8 ft.

Well seal:  
Material BENTONITE/  
Amount 400# / 300

Borehole diameter  
12 in.

Bentonite plug at least 2 ft. thick

Filter pack  
8 ft.  
TO  
30 ft.

Screen  
material PVC  
interval(s):  
From 10 To 30  
From \_\_\_\_\_ To \_\_\_\_\_  
Slot size .020 in.

Filter pack:  
Material SILICA SAND  
Size 10/20 in.

(5) **WELL TEST:**

☐ Pump      ☐ Bailer      ☐ Air      ☐ Flowing Artesian

Permeability \_\_\_\_\_ Yield \_\_\_\_\_ GPM

Conductivity \_\_\_\_\_ PH \_\_\_\_\_

Temperature of water 63 °F      Depth artesian flow found \_\_\_\_\_ ft.

Was water analysis done?    ☐ Yes    ☐ No

By whom? \_\_\_\_\_

Depth of strata to be analyzed. From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Remarks: \_\_\_\_\_

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

Signed Stan Machado MWC Number 1004  
Date 6/11/92

(bonded) Monitor Well Constructor Certification:  
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed [Signature] MWC Number 14011  
Date 2/28/23

Name of supervising Geologist/Engineer STEVE TAYLOR-EMCON

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER



MULT  
3075

15/1E/11dc  
Start Card # 43100

(6) LOCATION OF WELL By legal description

Well Location: County MULTNOMAH

Township 1 (N or S) Range 1 (E or W) Section 11

1. SW 1/4 of SE 1/4 of above section.

2. Street address of well location 3700 S.E. 17TH AVE  
PORTLAND, OR.

3. Tax lot number of well location S, 7 + 8

4. ATTACH MAP WITH LOCATION IDENTIFIED.

(7) STATIC WATER LEVEL: 17 Ft. below land surface. Date 6/9/92  
Artesian Pressure \_\_\_\_\_ lb/sq. in. Date \_\_\_\_\_

(3) DRILLING METHOD

☐ Rotary Air      ☐ Rotary Mud      ☐ Cable

☒ Hollow Stem Auger      ☐ Other \_\_\_\_\_

(4) BORE HOLE CONSTRUCTION

Special Standards      Yes   No  
                                 ☐   ☒      Depth of completed well 30 ft.

(8) WATER BEARING ZONES: 17'  
Depth at which water was first found

From	To	Est. Flow Rate	SWL

(9) WELL LOG: Ground elevation \_\_\_\_\_

[illegible]

Date started 6/9/92 Completed 6/9/92

(unbonded) Monitor Well Constructor Certification:  
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

(bonded) Monitor Well Constructor Certification:  
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed [Signature] MWC Number 1001  
Date 1/3/92

(5) **WELL TEST:**

☐ Pump      ☐ Bailer      ☐ Air      ☐ Flowing Artesian

Permeability \_\_\_\_\_ Yield \_\_\_\_\_ GPM

Conductivity \_\_\_\_\_ PH \_\_\_\_\_

Temperature of water 63 °F      Depth artesian flow found \_\_\_\_\_ ft.

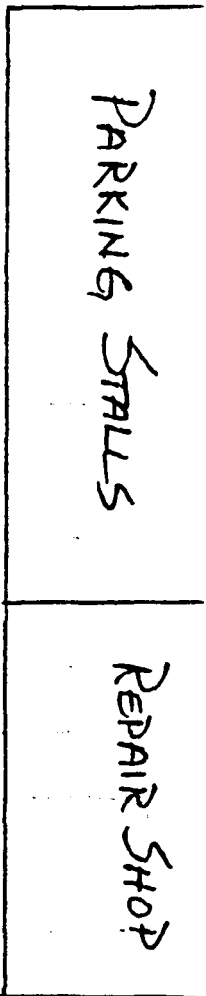
Was water analysis done?    ☐ Yes    ☐ No

By whom? \_\_\_\_\_

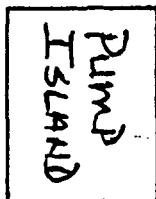
Depth of strata to be analyzed. From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Remarks: \_\_\_\_\_

Name of supervising Geologist/Engineer STEVE TAYLOR - EMCON

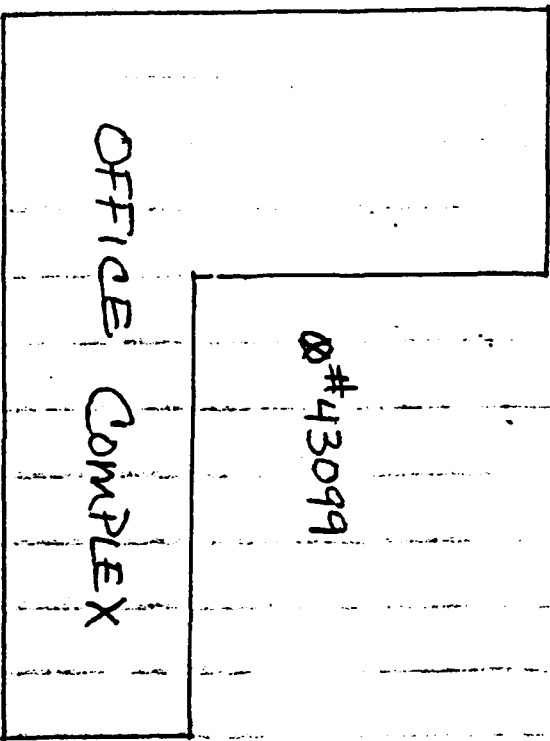


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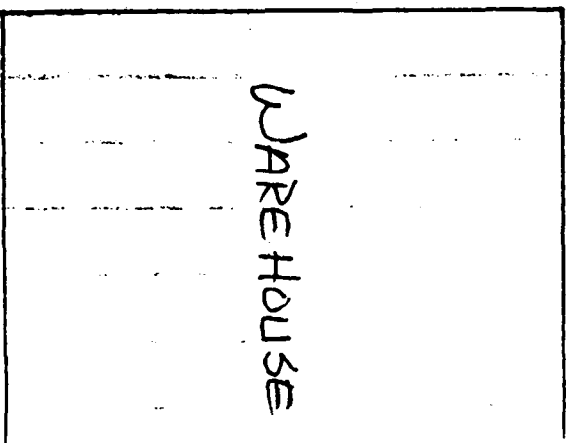


#43100

#43099



#43102



P.G.E. SERVICE CENTER  
3700 S.E. 17TH AVE.

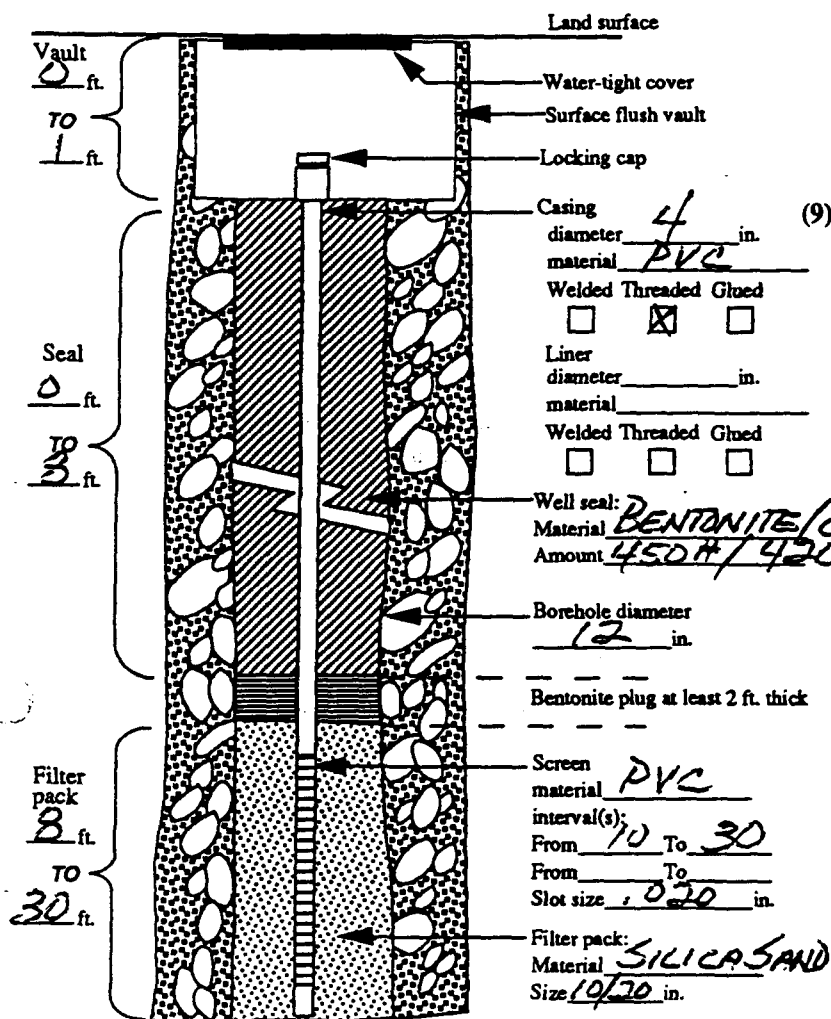
S.E. 17TH AVE.

MULT  
3077

15/1E/11 dc  
Start Card # 43102

#### (4) BORE HOLE CONSTRUCTION

(8) WATER BEARING ZONES:  
Depth at which water was first found 17.5'



From	To	Est. Flow Rate	SWL

[illegible]

Date started 6/10/92 Completed 6/10/92

(5) **WELL TEST:**

☐ Pump      ☐ Bailer      ☐ Air      ☐ Flowing Artesian

Permeability \_\_\_\_\_ Yield \_\_\_\_\_ GPM

Conductivity \_\_\_\_\_ PH \_\_\_\_\_

Temperature of water 63 °F/C      Depth artesian flow found \_\_\_\_\_ ft.

Was water analysis done? ☐ Yes ☐ No

By whom? \_\_\_\_\_

Depth of strata to be analyzed. From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Remarks: \_\_\_\_\_

**(unbonded) Monitor Well Constructor Certification:**

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to the best knowledge and belief.

Signed Stan Machado MWC Number 10049  
Date 6/11/92

**(bonded) Monitor Well Constructor Certification:**

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

Signed [Signature] MWC Number 1094  
Date 2/27

Name of supervising Geologist/Engineer STEVE TAYLOR-EMCON

ORIGINAL & FIRST COPY WATER RESOURCES DEPARTMENT SECOND COPY CONSTRUCTOR THIRD COPY CUSTOMER

STATE OF OREGON  
WATER WELL REPORT  
(as required by ORS 537.765)

WELL IDENTIFICATION

2N/1W-26

(1) OWNER:

Name George Jarrell Owner's Well Number: \_\_\_\_\_  
Address Star Rv 180  
City Forest Grove State Oregon Zip 97116

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:

☒ Rotary Air ☐ Rotary Mud ☐ Cable ☐ Other

(4) PROPOSED USE:

☒ Domestic ☐ Community ☐ Industrial ☐ Irrigation  
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Depth of Completed Well 3.50 ft.

Special Standards date of approval \_\_\_\_\_

HOLE		SEAL		Amount	
meter	From To	Material	From To	sacks or pounds	
1"	0 21	Cement	18 21	8	
		Bentonite	18 18	13	

How was seal placed? Method ☐ A ☐ B ☐ C ☐ D ☒ E

☐ Other \_\_\_\_\_

Backfill placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft. Material \_\_\_\_\_

Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft. Size of gravel \_\_\_\_\_

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	6"	4 1/2"	52'	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Liner:	4"	101	350	165	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Location of shoe(s) \_\_\_\_\_

(7) PERFORATIONS/SCREENS:

☒ Perforations

Method \_\_\_\_\_

☐ Screens

Type \_\_\_\_\_

Material \_\_\_\_\_

mm	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
10	350	1/8 x 6	30	1/8 x 6		<input type="checkbox"/>	<input checked="" type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

☐ Pump

☐ Bailer

☒ Air

☐ Flowing  
☐ Artesian

Yield gal/min

Pumping level

Drill stem at

Time

7  
7

350  
310

1 hr  
X

Temperature of water 54 Depth Artesian Flow Found \_\_\_\_\_

Was a water analysis done? ☐ Yes By whom \_\_\_\_\_

Did any strata contain water not suitable for intended use? ☐ Too little

☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other \_\_\_\_\_

Depth of strata: \_\_\_\_\_

(9) LOCATION OF WELL by legal description:

County Washington Latitude \_\_\_\_\_ Longitude \_\_\_\_\_  
Township 2N N or S. Range 1W E or W. WM.  
Section 26 SW 1/4 NW 1/4  
Tax Lot \_\_\_\_\_ Lot \_\_\_\_\_ Block \_\_\_\_\_ Subdivision \_\_\_\_\_  
Street Address of Well (or nearest address) \_\_\_\_\_

(10) STATIC WATER LEVEL:

200 ft. below land surface. Date 5-16-87  
Artesian pressure \_\_\_\_\_ lb. per square inch. Date \_\_\_\_\_

(11) WELL LOG:

Ground elevation \_\_\_\_\_

Material	From	To	WB?	SWL
Top Soil	0	1		
Brown Clay	1	40		
Gray Clay Hard	40	150		
Sand & Clay	150	350		

Date started 5-14-87 Completed 5-16-87

(unbonded) Water Well Constructor Certification:

I constructed this well in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

Signed Cyril Date \_\_\_\_\_

(bonded) Water Well Constructor Certification:

I accept responsibility for construction of this well and its compliance with all Oregon water well standards. This report is true to the best of my knowledge and belief.

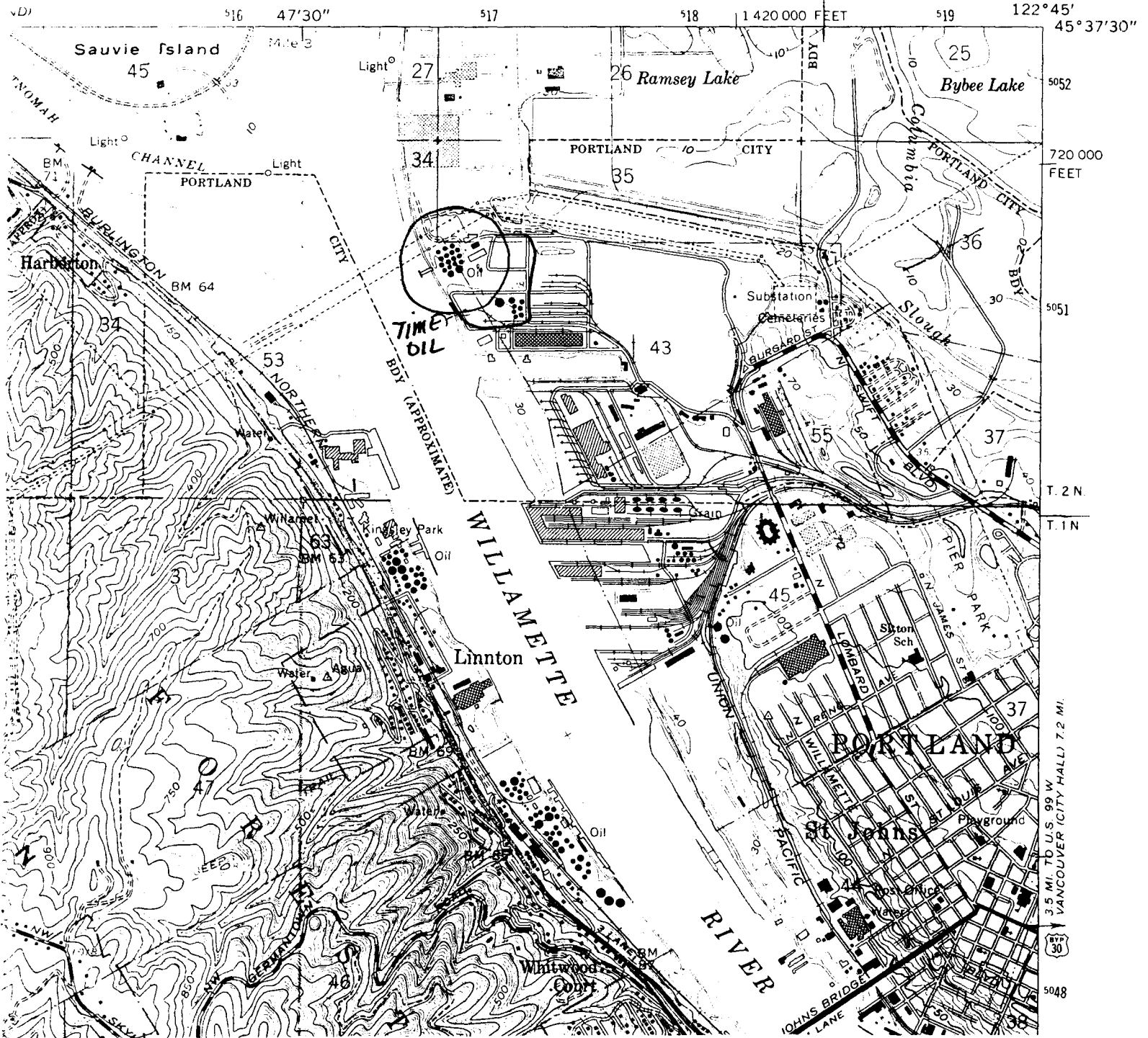
Signed Cyril Van derhey Date 5-26-87

Company \_\_\_\_\_ Co. Job No. \_\_\_\_\_

RECEIVED

LINN-ON QUADRANGLE  
OREGON  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
SE/4 HILLSBORO 15' QUADRANGLE

1475 II NW  
(VANCOUVE



# LEGAL

49/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 12

SAMPLE: Z1004

*PK*

## PCB'S METHOD 608

=====

AMOUNT	PARAMETER
MG/KG	

=====

<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

48/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 11

SAMPLE: Z1016

PK

PCB'S  
METHOD 608

AMOUNT	PARAMETER
MG/KG	
<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 10

SAMPLE: Z1017

REK

47/49

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
MG/KG	

=====

<100	PCB GROUP 1
<100	PCB GROUP 2
<50	PCB GROUP 3
<50	PCB GROUP 4
<50	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.



# LEGAL

46/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 9

SAMPLE: Z1018

OK

PCB'S  
METHOD 608

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<10	PCB GROUP 1
<10	PCB GROUP 2
<5	PCB GROUP 3
<5	PCB GROUP 4
<5	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

45/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 8

SAMPLE: Z1012

PCB'S  
METHOD 608

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<0.75	PCB GROUP 1
<0.25	PCB GROUP 2
<0.15	PCB GROUP 3
<0.15	PCB GROUP 4
<0.15	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

44/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 7

SAMPLE: Z1011

PCB'S  
METHOD 608

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

43/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 6

SAMPLE: Z1010

*pek*

PCB'S  
METHOD 608

```
=====
AMOUNT      PARAMETER
MG/KG
=====
```

```
<0.25  PCB GROUP 1
<0.1   PCB GROUP 2
.09    PCB GROUP 3
<0.05  PCB GROUP 4
<0.05  PCB GROUP 5
.09    TOTAL PCB
```

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.  
PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.  
PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.  
PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.  
PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

42/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 5

SAMPLE: 21009

*DEK*

PCB'S  
METHOD 608

AMOUNT	PARAMETER
MG/KG	

<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

41/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 4

SAMPLE: Z1008

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
MG/KG	

=====

<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

# LEGAL

40/99

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 3

SAMPLE: Z1019

Q2K

PCB'S  
METHOD 608

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 1

SAMPLE: Z1020

LEGAL

38/49

PCB'S  
METHOD 608

=====

AMOUNT	PARAMETER
MG/KG	

=====

<0.5	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.



# LEGAL

39/49

DATE: 14 JAN 85

LAB #: 84-1020

ITEM #: 2

SAMPLE: Z1007

PCB'S  
METHOD 608

AMOUNT	PARAMETER
MG/KG	

<0.25	PCB GROUP 1
<0.1	PCB GROUP 2
<0.05	PCB GROUP 3
<0.05	PCB GROUP 4
<0.05	PCB GROUP 5
0	TOTAL PCB

PCB GROUP 1 INCLUDES PCB 1221 AND IS  
CALCULATED AS 1221.

PCB GROUP 2 INCLUDES PCB 1232 AND IS  
CALCULATED AS 1232.

PCB GROUP 3 INCLUDES PCB'S 1016, 1242,  
AND 1248 AND IS CALCULATED AS  
1242.

PCB GROUP 4 INCLUDES PCB 1254 AND IS  
CALCULATED AS 1254.

PCB GROUP 5 INCLUDES PCB'S 1260 AND 1262  
AND IS CALCULATED AS 1260.

DEPARTMENT OF ENVIRONMENTAL QUALITY  
Laboratory Data Sheet

Laboratory No: 84-1020  
Program Code: 4290  
Page: 1 of: 49  
Analysis Completed: JAN 04 1985

Time Oil

RFG

Item No.	Test Results (All units in <u>mg/l</u> or <u>ug/m<sup>3</sup></u> )											
	bag #	EP Tox Pb										
1	Z1020	<0.1										
2	Z1007	<0.1										
3	Z1019	<0.1										
4	Z1008	<0.1										
5	Z1009	<0.1										
6	Z1010	<0.1										
7	Z1011	<0.1										
8	Z1012	<0.1										
9	Z1018	<0.1										
10	Z1017	<0.1										
11	Z1016	<0.1										
12	Z1004	<0.1										

Comments: \_\_\_\_\_

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 10

SAMPLE: 21017

LEGAL

29/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	1020	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	71	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSC-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

26/49

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 9

SAMPLE: Z1018

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
515	PENTACHLOROPHENOL
12	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
3	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 8

SAMPLE: Z1012

LEGAL

23/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<1 PHENOL  
<1 2-CHLOROPHENOL  
<1 2-NITROPHENOL  
<1 2,4-DIMETHYLPHENOL  
<1 2,4-DICHLOROPHENOL  
<1 4-CHLORO-3-METHYLPHENOL

=====

AMOUNT	PARAMETER
MG/KG	

=====

<1 2,4,6-TRICHLOROPHENOL  
<1 2,4-DINITROPHENOL  
<1 4-NITROPHENOL  
<1 2-METHYL-4,6-DINITROPHENOL  
<1 PENTACHLOROPHENOL  
<1 TETRACHLOROPHENOL \*\*

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

=====

AMOUNT	PARAMETER
MG/KG	

=====

<1 BIS(2-CHLOROETHYL) ETHER  
<1 1,3-DICHLOROBENZENE  
<1 1,4-DICHLOROBENZENE  
<1 1,2-DICHLOROBENZENE  
<1 HEXACHLOROETHANE  
<1 N-NITROSO-DI-N-PROPYLAMINE  
<1 NITROBENZENE  
<1 ISOPHORONE  
<1 BIS(2-CHLOROETHOXY) METHANE  
<1 1,2,4-TRICHLOROBENZENE  
<1 NAPHTHALENE  
<1 HEXACHLOROBUTADIENE  
<1 HEXACHLOROCYCLOPENTADIENE  
<1 2-CHLORONAPHTHALENE  
<1 ACENAPHTHYLENE  
<1 DIMETHYLPHTHALATE  
<1 2,6-DINITROTOLUENE

=====

AMOUNT	PARAMETER
MG/KG	

=====

<1 ACENAPHTHENE  
<1 2,4-DINITROTOLUENE  
13 FLUORENE  
<1 DIETHYLPHTHALATE  
<1 N-NITROSDIPHENYLAMINE  
<1 4-BROMOPHENYL PHENYL ETHER  
<1 HEXACHLOROBENZENE  
14 PHENANTHRENE  
105 ANTHRACENE  
<1 DIBUTYL PHTHALATE  
<1 FLUORANTHENE  
<1 PYRENE  
<1 BUTYL BENZYL PHTHALATE  
<1 BENZ(A)ANTHRACENE  
<1 CHRYSENE  
<1 3,3'-DICHLOROBENZIDINE  
<1 BIS(2-ETHYLHEXYL) PHTHALATE  
<1 BENZ(A)PYRENE

# LEGAL

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 7

SAMPLE: Z1011

20/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 10

SAMPLE: Z1017

LEGAL

30/49

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

27/49

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 9

SAMPLE: 21018

PESTICIDES

METHOD 625

EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)



LEGAL

24/49

DATE: 03 JAN 85

LAB #: 84-1020

ITEM #: 8

SAMPLE: Z1012

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

2/1/49

DATE: 03 JAN 85

DJM

LAB #: 84-1020

ITEM #: 7

SAMPLE: Z1011

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

LEGAL

31/49

DM

03 JAN 85

GC/MS SCAN ID

84-1020 Z1017

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
1-ETHYL-4-METHYLCYCLOHEXANE	10
2,6-DIMETHYLOCTANE	10
4-METHYLNONANE	8
1-METHYL-4-(1-METHYLETHYL)CYCLOHEXANE	12
4-METHYLDECANE	36
BUTYLCYCLOHEXANE	14
5-METHYLDECANE	15
3-METHYLDECANE	8
UNDECANE	18
OCTYLCYCLOPROPANE	53

THE SAMPLE ALSO CONTAINED NUMEROUS OTHER COMPOUNDS NOT IDENTIFIED. THE PATTERN, HOWEVER, WAS INDICATIVE OF A SOLVENT MIXTURE SIMILAR TO PAINT THINNER.

LEGAL

28/49

DH

03 JAN 85

GC/MS SCAN ID

84-1020 Z1018

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNNS ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
DODECANE	6
TRIDECANE	8
PENTADECANE	6

LEGAL

25/49

DH

03 JAN 85

GC/MS SCAN ID

84-1020 Z1012

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

8/11  
LEGAL

22/49

03 JAN 85

GC/MS SCAN ID

84-1020 Z1011

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

# LEGAL

36/49

DATE: 02 JAN 85

LAB #: 84-1020

ITEM #: 12

SAMPLE: Z1004

PESTICIDES

METHOD 625

EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

DATE: 02 JAN 85

LAB #: 84-1020

ITEM #: 12

SAMPLE: 71004

LEGAL

35/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHthalate
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHthalate	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE



DATE: 02 JAN 85

LAB #: 84-1020

ITEM #: 11

SAMPLE: Z1016

LEGAL

32/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

DATE: 02 JAN 85

LAB #: 84-1020

ITEM #: 11

SAMPLE: Z1016

LEGAL

33/49

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

DATE: 02 JAN 85 *DM*

# LEGAL

6/49

LAB #: 84-1020

ITEM #: 2

SAMPLE: Z1007

PESTICIDES

METHOD 625

EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

DJH  
**LEGAL**

7/49

02 JAN 85

GC/MS SCAN ID

84-1020 Z1007

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

34/39

DJH

02 JAN 85

GC/MS SCAN ID

84-1020 Z1016

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

37/49

8/1

02 JAN 85

GC/MS SCAN ID

84-1020 Z1004

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWNNS ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWNNS WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

# LEGAL

13/49

DJH

31 DEC 84

GC/MS SCAN ID

84-1020 Z1008

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/L. THE FOLLOWING COMPOUNDS WERE TENTATIVELY IDENTIFIED WITH THE ESTIMATED CONCENTRATIONS SHOWN.

COMPOUND	MG/KG
NONANE	1
DECANE	4
4-METHYLDECANE	3
UNDECANE	19
2-METHYLUNDECANE	8
DODECANE	46
TRIDECANE	67
7-METHYLTRIDECANE	38
HENEICOSANE	37

LEGAL

4/49

dyh

31 DEC 84

GC/MS SCAN ID

84-1020 Z1020

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 1.0 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.



# LEGAL

11/49

DATE: 31 DEC 84

*dyh*

LAB #: 84-1020

ITEM #: 4

SAMPLE: Z1008

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	3	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	2	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
1	ISOPHORONE	1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

DATE: 31 DEC 84

# LEGAL

2/49

LAB #: 84-1020

ITEM #: 1

SAMPLE: Z1020

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT	PARAMETER
MG/KG	

<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT	PARAMETER
MG/KG	

<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT	PARAMETER
MG/KG	

<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT	PARAMETER
MG/KG	

<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE

# LEGAL

12/49

DATE: 31 DEC 84

*DM*

LAB #: 84-1020

ITEM #: 4

SAMPLE: Z1008

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

3/49

DATE: 31 DEC 84

LAB #: 48-1020

ITEM #: 1

SAMPLE: Z1020

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

15/49

DATE: 28 DEC 84

*SM*

LAB #: 84-1033

ITEM #: 5

SAMPLE: 71009

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

18/49

DATE: 28 DEC 84

SM

LAB #: 84-1033

ITEM #: 6

SAMPLE: Z1010

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NCNACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

# LEGAL

17/49

DATE: 28 DEC 84

LAB #: 84-1033

ITEM #: 6

SAMPLE: Z1010

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KG		MG/KG	
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT	PARAMETER	AMOUNT	PARAMETER
MG/KG		MG/KG	
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

DATE: 28 DEC 84

LAB #: 84-1020

ITEM #: 5

SAMPLE: 21009

# LEGAL

14/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	PHENOL
<1	2-CHLOROPHENOL
<1	2-NITROPHENOL
<1	2,4-DIMETHYLPHENOL
<1	2,4-DICHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	2,4,6-TRICHLOROPHENOL
<1	2,4-DINITROPHENOL
<1	4-NITROPHENOL
<1	2-METHYL-4,6-DINITROPHENOL
<1	PENTACHLOROPHENOL
<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	BIS(2-CHLOROETHYL) ETHER
<1	1,3-DICHLOROBENZENE
<1	1,4-DICHLOROBENZENE
<1	1,2-DICHLOROBENZENE
<1	HEXACHLOROETHANE
<1	N-NITROSO-DI-N-PROPYLAMINE
<1	NITROBENZENE
<1	ISOPHORONE
<1	BIS(2-CHLOROETHOXY) METHANE
<1	1,2,4-TRICHLOROBENZENE
<1	NAPHTHALENE
<1	HEXACHLOROBUTADIENE
<1	HEXACHLOROCYCLOPENTADIENE
<1	2-CHLORONAPHTHALENE
<1	ACENAPHTHYLENE
<1	DIMETHYLPHTHALATE
<1	2,6-DINITROTOLUENE

AMOUNT MG/KG	PARAMETER
-----------------	-----------

<1	ACENAPHTHENE
<1	2,4-DINITROTOLUENE
<1	FLUORENE
<1	DIETHYLPHTHALATE
<1	N-NITROSODIPHENYLAMINE
<1	4-BROMOPHENYL PHENYL ETHER
<1	HEXACHLOROBENZENE
<1	PHENANTHRENE
<1	ANTHRACENE
<1	DIBUTYL PHTHALATE
<1	FLUORANTHENE
<1	PYRENE
<1	BUTYL BENZYL PHTHALATE
<1	BENZ(A)ANTHRACENE
<1	CHRYSENE
<1	3,3'-DICHLOROBENZIDINE
<1	BIS(2-ETHYLHEXYL) PHTHALATE
<1	BENZ(A)PYRENE



LEGAL

9/49

DATE: 28 DEC 84

LAB #: 84-1033

ITEM #: 3

SAMPLE: 21019

PESTICIDES  
METHOD 625  
EXTRACTED BY RCRA 3540

=====

AMOUNT	PARAMETER
MG/KG	

=====

<5	ALPHA-BHC
<5	HEPTACHLOR
<5	ALDRIN
<5	HEPTACHLOR EPOXIDE
<5	ENDOSULFAN I
<5	TRANS-NONACHLOR
<5	P,P'-DDE
<5	DIELDRIN
<5	ENDRIN
<5	ENDOSULFAN II
<5	P,P'-DDD
<5	ENDOSULFAN CYCLIC SULFATE
<5	P,P'-DDT
<5	GAMMA-BHC (LINDANE)

DATE: 28 DEC 84

LAB #: 84-1033

ITEM #: 3

SAMPLE: Z1019

# LEGAL

8/49

ACID EXTRACTABLES  
METHOD 625  
EXTRACTED BY RCRA METHOD 3540

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	PHENOL	<1	2,4,6-TRICHLOROPHENOL
<1	2-CHLOROPHENOL	<1	2,4-DINITROPHENOL
<1	2-NITROPHENOL	<1	4-NITROPHENOL
<1	2,4-DIMETHYLPHENOL	<1	2-METHYL-4,6-DINITROPHENOL
<1	2,4-DICHLOROPHENOL	<1	PENTACHLOROPHENOL
<1	4-CHLORO-3-METHYLPHENOL	<1	TETRACHLOROPHENOL **

\*\* REPORTED AS  
2,3,4,6-TETRACHLOROPHENOL

BASE/NEUTRAL EXTRACTABLES  
METHOD 625

AMOUNT MG/KG	PARAMETER	AMOUNT MG/KG	PARAMETER
<1	BIS(2-CHLOROETHYL) ETHER	<1	ACENAPHTHENE
<1	1,3-DICHLOROBENZENE	<1	2,4-DINITROTOLUENE
<1	1,4-DICHLOROBENZENE	<1	FLUORENE
<1	1,2-DICHLOROBENZENE	<1	DIETHYLPHTHALATE
<1	HEXACHLOROETHANE	<1	N-NITROSODIPHENYLAMINE
<1	N-NITROSO-DI-N-PROPYLAMINE	<1	4-BROMOPHENYL PHENYL ETHER
<1	NITROBENZENE	<1	HEXACHLOROBENZENE
<1	ISOPHORONE	<1	PHENANTHRENE
<1	BIS(2-CHLOROETHOXY) METHANE	<1	ANTHRACENE
<1	1,2,4-TRICHLOROBENZENE	<1	DIBUTYL PHTHALATE
<1	NAPHTHALENE	<1	FLUORANTHENE
<1	HEXACHLOROBUTADIENE	<1	PYRENE
<1	HEXACHLOROCYCLOPENTADIENE	<1	BUTYL BENZYL PHTHALATE
<1	2-CHLORONAPHTHALENE	<1	BENZ(A)ANTHRACENE
<1	ACENAPHTHYLENE	<1	CHRYSENE
<1	DIMETHYLPHTHALATE	<1	3,3'-DICHLOROBENZIDINE
<1	2,6-DINITROTOLUENE	<1	BIS(2-ETHYLHEXYL) PHTHALATE
		<1	BENZ(A)PYRENE

# LEGAL

12/49

D/H

28 DEC 84

GC/MS SCAN ID

84-1020 Z1010

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

16/49

2/11

28 DEC 84

GC/MS SCAN ID

84-1020 21009

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

LEGAL

10/49

8/11

28 DEC 84

GC/MS SCAN ID

84-1020 Z1019

THE WATER SAMPLE WAS EXTRACTED BY EPA RCRA PROCEDURE 3540 (ACETONE/HEXANE) AND ANALYZED BY GC/MS. IN ADDITION TO THE PRIORITY POLLUTANT CHEMICALS, THE SAMPLE WAS SCANNED FOR ANY OTHER UNKNOWN ABOVE THE DETECTION LIMIT OF 10 MG/KG. NO UNKNOWN WERE IDENTIFIED ABOVE THAT DETECTION LIMIT.

# LEGAL

1/2  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
Request for Analysis

Laboratory No. 84-1020

Location/Site: Time Oil

Date: 12 Dec 84

Date Received Lab: DEC 13 1984 1245

Collected By: AFG, JLS

Program: 4290

Date Reported: JAN 15 1985

Purpose: RCRA Site Survey

Report Data To: Gates, Smith

Comments: Samples backed in Refrigerator # 1208 overnight and removed for log-in 13 Dec 84 lab prepared

\* Basic (P) unpreserved; Nutrient (R) add H<sub>2</sub>SO<sub>4</sub> in field; Metals (Tm) HNO<sub>3</sub> added in lab--don't rinse; Organic(X) mason jar

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s				Test Required
		Nutrients	DO	Metals		
		Basic	BOD	Organic		
1	Composite soil core (surface + 1' + 2' + 3') See map for location				Z1020	EP Lead GC/MS - Acids, BW PCB's
2	"				Z1007	"
3	"				Z1019	"
4	"				Z1008	"
5	"				Z1009	"
6	"				Z1010	"

Laboratory comments \_\_\_\_\_

LEGAL

2/2

DEPARTMENT OF ENVIRONMENTAL QUALITY  
Request for AnalysisLaboratory No. 84-1020Location/Site: Time Oil Date: 12 Dec 84Date Received Lab: DEC 13 1984 1245Collected By: RF6, JLS Program: 4290Date Reported: JAN 15 1985

Purpose: \_\_\_\_\_

Report Data To: \_\_\_\_\_

Comments: \_\_\_\_\_

lab prepared

\* Basic (P) unpreserved; Nutrient (R) add H<sub>2</sub>SO<sub>4</sub> in field; Metals (Tm) HNO<sub>3</sub> added in lab--don't rinse; Organic(X) mason jar

Item No.	Sampling Point Description (include time)	*Sample Container (bottle) #'s				Test Required
		Nutrients Basic	DO BOD	Metals Organic		
7 ✓	"				Z1011	EP tox Pb " GCMS acid/BN PCB's
8 ✓	"				Z1012	"
9 ✓	"				Z1018	"
10 ✓	"				Z1017	"
11 ✓	"				Z1016	"
12 ✓	"				Z1004	"

Laboratory comments \_\_\_\_\_

BZTO104(e)012011

— TIME OIL CO.  
PCB INVESTIGATION



[illegible]

SAMPLE TAKEN DECEMBER  
12, 1983. CONDITIONS HEAVY  
RAIN. TAKEN AT APPROX.

SAMPLE TAKEN FROM SOIL,  
AROUND BASE, WHERE  
SPILL OCCURRED ON SOUTH  
SIDE OF STORAGE TANK.

PERSONAL EXPOSURE OC-  
CURRED FROM SAWING AN  
ACCESS OPENING IN THE  
SHELL OF THE TANK. EX-  
POSURE TO HEAVY VAPORS  
CAME WHILE USING  
PNEUMATIC SAW FOR MAKING  
CUTS. EXPOSURE TO SUS-  
PECTED TOXIC SLUDGE  
CAME AS ACCESS PLATE  
SWUNG OUT AND HEAVY  
SLUDGE SEEMED TO BECOME  
MORE FLUID AND RUSHED  
OUT CONTACTING LOWER  
LEG AND FEET AREA  
AND HANDS. CLOTHES, SHOES  
AND SOCKS DISPOSED  
OF AFTER BURNING  
SENSATION BECAME VERY  
APPARENT.



engineers  
planners  
economists  
scientists

TO: Jan Purdy

Environmental Laboratory

Date: January 13, 1984

Invoice No.: 30653

Subject: Supplemental report to that of December 29, 1983, on this invoice number. The analysis of the other two soil samples for Merten & Fink, Attorneys-At-Law, Portland, Oregon. The sampling information and notes on the previous report are applicable to this report. Sample 1648 is the smallest of the three samples. The samples were analyzed on an as-received basis and the results are expressed in mg/kg or parts per million.

Sample

PCB, Arochlor 1248

1648

29.4 mg/kg

1649

1060 mg/kg

The information shown on this sheet is test data only and no interpretation is intended or implied.

Samples will be retained 30 days unless otherwise requested.

Reported by: Earl A. Hadfield II  
Earl A. Hadfield II

/CVLAB/022



engineers  
planners  
economists  
scientists

RECEIVED

JAN - 4 1984

Ans'd.....

Environmental Laboratory

Date: December 29, 1983

Invoice No.: 30653

Subject: Analysis of one of several soil samples for Merten & Fink, Attorneys-At-Law, Portland, Oregon. The samples were received December 16, 1983, and assigned reference Nos. 1648-1650. Sample 1650, having the least water and the most tarlike appearance, was analyzed for polychlorinated byphenyls (PCB). The sample was analyzed on an as received basis and the results are expressed in mg/kg or parts per million.

Found

PCB, Arochlor 1248

584 mg/kg

Note:

1. Arochlor 1248 is the predominant PCB. Other PCB's and compounds may be present, but were not identified or quantified.
2. An analysis on gas chromatograph/mass spectrometer may be in order to confirm the PCB analysis and identify other potential compounds as well.
3. The samples were shipped via Greyhound. The box was sealed with silver duct tape. Copies of papers shipped with the samples are attached.

The information shown on this sheet is test data only and no interpretation is intended or implied.

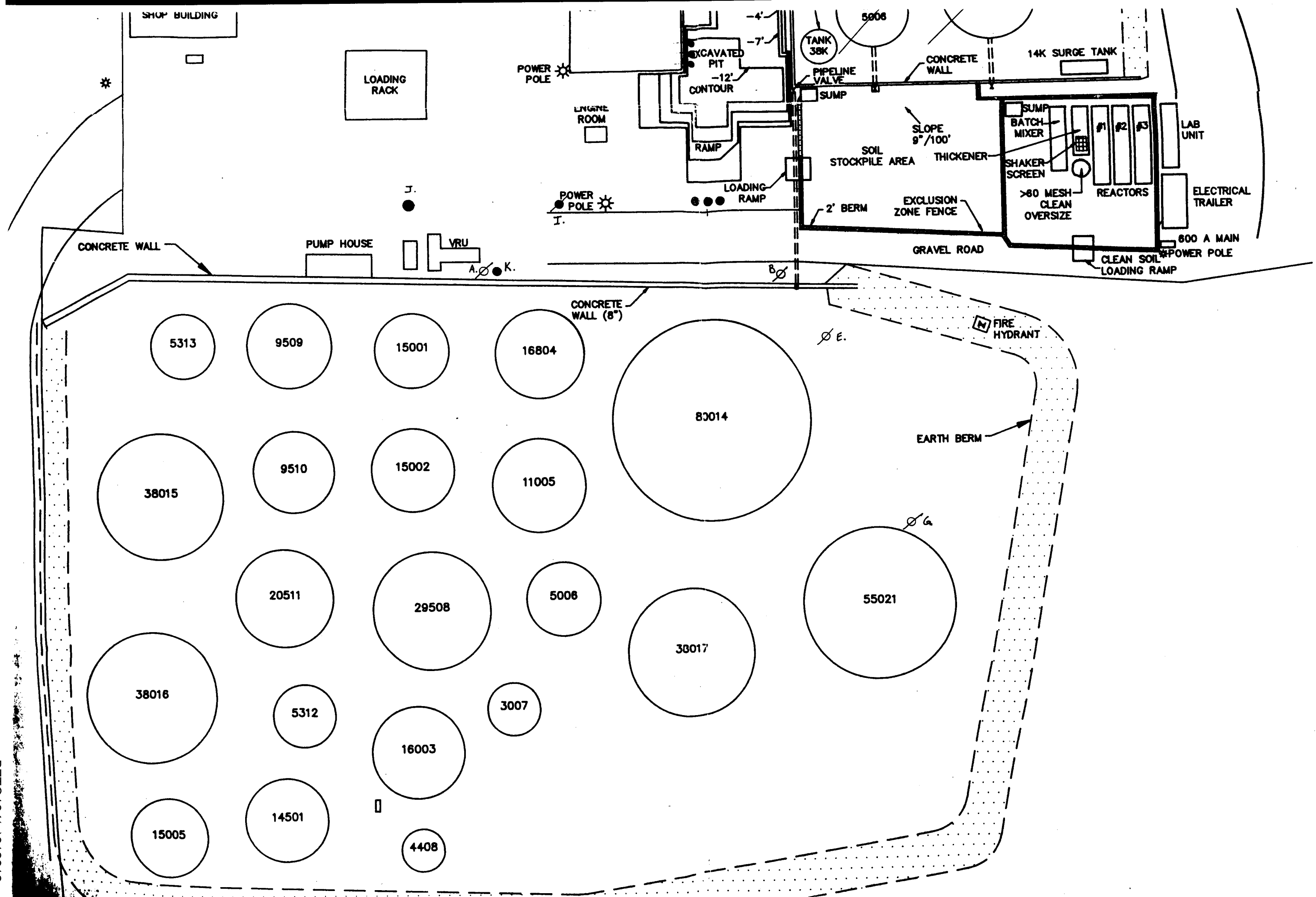
Samples will be retained 30 days unless otherwise requested.

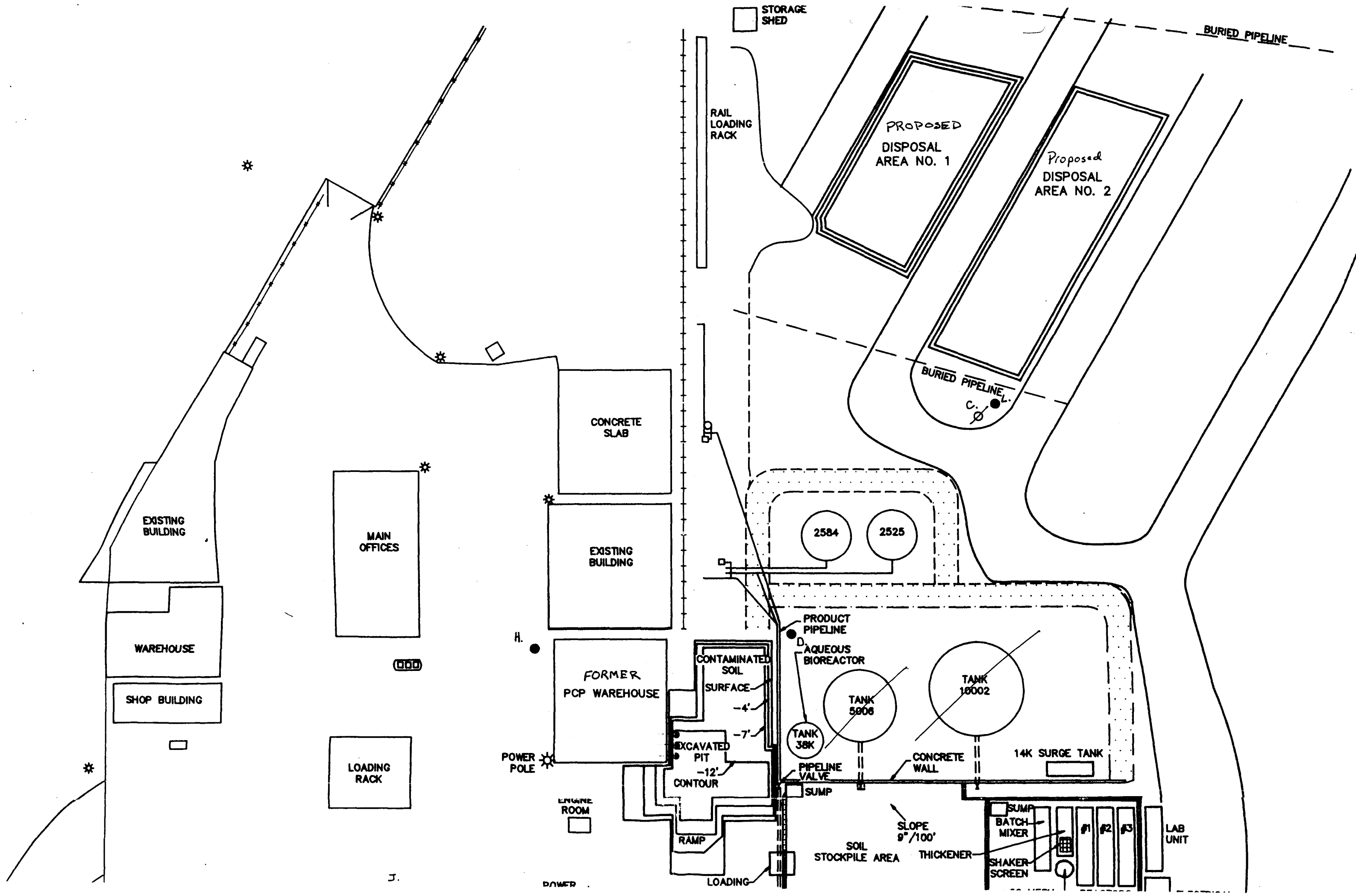
Reported by:

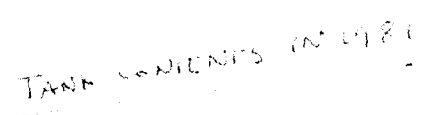
Earl A. Hadfield II  
Earl A. Hadfield II

dmk/CVLAB/002  
Attachment

- TIME OIL CO.  
SITE MAPS





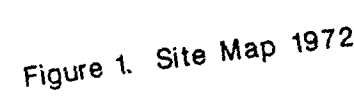




# WOOD TREATING CHEMICAL TANKS

6-1-81

TANK NUMBER	PRODUCT
13001 * * * * *	TIMBERTOX 40 CONCENTRATE
20001 * * * * *	WOODTOX 140 RTU
20002 * * * * *	WOODTOX PREPRIME RTU
20003 * * * * *	KB-3
7004 * * * * *	MTY
8005 * * * * *	WOODTOX 140 CONCENTRATE
8006 * * * * *	OXO BOTTOMS
8007 * * * * *	OXO BOTTOMS
6008 * * * * *	WOODTOX PREPRIME CONCENTRATE
38009 * * * * *	325 SOLVENT
3010 * * * * *	MTY
RICHFIELD * * * * *	WOODTOX 140 CONCENTRATE





██████████  
OIL CO.  
ANALYSIS OF TIME'S EMPTY  
TTLES  
██████████



# Ecology and environment, inc.

108 SOUTH WASHINGTON, SUITE 302, SEATTLE, WASHINGTON 98104, TEL. 206-624-9537

International Specialists in the Environmental Sciences

TDD  
HH  
II

## MEMORANDUM

DATE: January 10, 1985

TO: John Osborn, FIT RPO  
USEPA, Region X

FROM: Andrew Hafferty, Chemist, E&E, Seattle  
Jim Farr, Sr. Chemist, E&E, Seattle

THRU: Dave Buecker, FIT RPM  
E&E, Seattle

SUBJ: QA of Organic Samples; Case 1973  
Time Oil Empty Bottles

REF: TDD R10-8411-04

CC: Arnold Gahler, EPA, Manchester

The review of the organic analytical data for several empty bottles associated with Case 1973 has been completed. These bottles were analyzed by Environmental Monitoring and Services, Inc. Newbury Park, CA.

Sample	Bottles
S2556	one 8 oz.
S2557	one 40ml VOA plus one 1/2 gallon BNA/PEST
S2568	one 40ml VOA plus one 1/2 gallon BNA/PEST

Each bottle was rinsed with laboratory water, which was subsequently analyzed for volatile organics, pesticides, or semi-volatile organics (BNA's) as prescribed; the S2556 bottle was screened for BNA's and pesticides.

Case 1973 was received by the lab between November 30, 1983 and December 2, 1983.

### DATA QUALIFICATIONS

1) Bottle holding times:  
sample no. S2556

analysis	VOA	BNA	PEST
receipt by lab till extraction	N/A	≈125 days	≈125 days
extraction till analysis	N/A	≈60 days	≈150 days

sample no. S2557

# DATA QUALIFICATIONS (cont.)

- 1) Bottle holding times:  
sample no. S2568

analysis	VOA	BNA	PEST
receipt by lab till extraction	≈110 days	≈125 days	≈125 days
extraction till analysis	---	≈60 days	≈150 days

- 2) Tuning

BFB tuning occurred on March 22, 1984 at 0938. The ion abundance criteria for two masses were out of control.

m/e	% Relative Abundance	Control Limits (%)
175	3.0%	5-9%
177	4.3%	5-9%

- 3) Calibration Checks

Semi-volatile compounds

June 4, 1984 at 2209 hrs.  
three out of five System Performance Check Compounds were  
outside QC limits

compound	RF	minimum acceptable RF
2,4-dinitrophenol	0.00	0.05
4-nitrophenol	0.00	0.05
benzidine	---	0.05

June 5, 1984 at 0527 hrs  
three out of five System Performance Check Compounds were  
outside QC limits

compound	RF	minimum acceptable RF
2,4-dinitrophenol	0.00	0.05
4-nitrophenol	0.00	0.05
benzidine	---	0.05

two out of 13 Calibration Check Compounds were outside QC limits

compound	%D	maximum acceptable %D
2,4,6-trichlorophenol	29%	25%
pentachlorophenol	27%	25%

Volatile compounds

March 22, 1984 at 1013

One out of six System Performance Check Compounds was outside QC  
limits

compound	RF	minimum acceptable RF
2-chloroethylvinylether	0.08	0.30

Volatile compounds

March 22, 1984 at 1013 (cont.)

one out of five Calibration Check Compounds was outside QC limits

compound	%D	maximum acceptable %D
1,1-dichloroethylene	59%	25%

4) Blanks

No BNA blank was run.

5) Surrogate Spikes

five out of 18 BNA surrogate recoveries were outside QC limits.

sample	compound	%recovery	QC limits
S2556	D <sub>14</sub> -p-Terphenyl	144%	33-128%
S2556	2,4,6-Tribromophenol	not detected	20-106%
S2557	D <sub>14</sub> -p-Terphenyl	29%	33-128%
S2557	2,4,6-Tribromophenol	not detected	20-106%
S2568	2,4,6-Tribromophenol	not detected	20-106%

6) Matrix Spikes and Matrix Spike Duplicated

No matrix spikes or matrix spike duplicates were run.

DATE USE - unacceptable data must be rejected based on evidence listed above

A mechanism does exist which screens sample bottles for contamination before they are sent into the field. Re-analysis of empty bottles provides almost no significant addition to the data package.

Based on these analyses, no conclusions as to the cleanliness of the bottles can be reached, primarily due to the extremely long holding times. Contaminants may have been lost or picked-up during storage of the bottles and the extracts. GC/MS Tuning and Calibration Checks did not meet minimum CLP requirements, which makes the data even more questionable. All the data have been flagged (J) to indicate estimated and questionable results.

AH:pc

BNA Only

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: CE-EMSI Case No: 1973  
Lab Sample ID No: 00152 (060584002) QC Report No: 1973  
Sample Matrix: Soil (Empty bottle) Contract No.: 68-01-6783  
Data Release Authorized By: G. Calvo Date Sample Received: 12/2/83

SEMI-VOLATILE COMPOUNDS

CONCENTRATION: LOW MEDIUM HIGH (circle one)  
DATE EXTRACTED/PREPARED: 07-APR-84  
DATE ANALYZED: 05-JUN-84  
PERCENT MOISTURE: \_\_\_\_\_  
CONC./DILUTION FACTOR: 1.0

PP #	CAS #	ug/l or ug/kg (circle one)	PP #	CAS #	ug/l or ug/kg (circle one)
(21A)	22-06-2	2,4,6-trichlorophenol 670 J	(52B)	87-68-3	hexachlorobutadiene 2000 J
(22A)	59-50-7	p-chloro-m-cresol 1330 J	(53B)	77-47-4	hexachlorocyclopentadiene 5000 J
(24A)	95-57-8	2-chlorophenol 1000 J	(54B)	78-59-1	isophorone 2000 J
(31A)	120-83-2	2,4-dichlorophenol 670 J	(55B)	91-20-3	naphthalene 1670 J
(34A)	105-67-9	2,4-dimethylphenol 670 J	(56B)	98-95-3	nitrobenzene 4000 J
(57A)	86-75-5	2-nitrophenol 1330 J	(61B)	62-75-9	N-nitrosodimethylamine 8330 J
(58A)	100-02-7	4-nitrophenol 13000 J	(62B)	86-30-6	N-nitrosodiphenylamine 3000 J
(59A)	51-28-5	2,4-dinitrophenol 11000 J	(63B)	621-64-7	N-nitrosopropylamine 4000 J
(60A)	534-52-1	4,6-dinitro-2-methylphenol 8000 J	(66B)	117-81-7	bis (2-ethylhexyl) phthalate 475 J
(64A)	87-86-5	pentachlorophenol 3330 J	(67B)	85-68-7	benzyl butyl phthalate 2000 J
(65A)	108-95-2	phenol 1000 J	(68B)	84-74-2	di-n-butyl phthalate 85 J
	65-85-0	benzoic acid 3330 J	(69B)	117-84-0	di-n-octyl phthalate 1000 J
	95-48-7	2-methylphenol 1000 J	(70B)	84-66-2	diethyl phthalate 1670 J
	108-39-4	4-methylphenol 5000 J	(71B)	131-11-3	dimethyl phthalate 1370 J
	95-95-4	2,4,5-trichlorophenol 670 J	(72B)	56-55-3	benzo(a)anthracene 1000 J
(1B)	83-32-9	acenaphthene 1670 J	(73B)	50-32-8	benzo(a)pyrene 1000 J
(5B)	92-87-5	benzidine 5000 J	(74B)	205-99-2	benzo(b)fluoranthene 3670 J
(8B)	120-82-1	1,2,4-trichlorobenzene 1670 J	(75B)	207-08-9	benzo(k)fluoranthene 1370 J
(9B)	118-74-1	hexachlorobenzene 1330 J	(76B)	218-01-9	chrysene 1000 J
(12B)	67-72-1	hexachloroethane 1330 J	(77B)	208-96-3	acenaphthylene 670 J
(18B)	111-44-4	bis(2-chloroethyl) ether 2000 J	(78B)	120-12-7	anthracene 1000 J
(20B)	91-58-7	2-chloronaphthalene 1330 J	(79B)	191-24-2	benzo(ghi)perylene 1330 J
(25B)	95-50-1	1,2-dichlorobenzene 1000 J	(80B)	86-73-7	fluorene 1000 J
(26B)	541-73-1	1,3-dichlorobenzene 1000 J	(81B)	83-01-8	phenanthrene 670 J
(27B)	106-46-7	1,4-dichlorobenzene 1000 J	(82B)	53-70-3	dibenzo(a,h)anthracene 1000 J
(28B)	91-94-1	3,3'-dichlorobenzidine 3330 J	(83B)	193-39-5	indeno(1,2,3-cd)pyrene 1000 J
(35B)	121-14-2	2,4-dinitrotoluene 4000 J	(84B)	129-00-0	pyrene 4000 J
(36B)	606-20-2	2,6-dinitrotoluene 3330 J		62-53-3	aniline 2000 J
(37B)	122-66-7	1,2-diphenylhydrazine		100-51-6	benzyl alcohol 3000 J
(39B)	206-44-0	fluoranthene 1670 J		106-47-8	4-chloroaniline 8000 J
(40B)	7005-72-3	4-chlorophenyl phenyl ether 670 J		132-64-9	dibenzofuran 1370 J
(41B)	101-55-3	4-bromophenyl phenyl ether 2330 J		91-57-6	2-methylnaphthalene 670 J
(42B)	39638-32-9	bis (2-chloroisopropyl) ether 1000 J		88-74-4	2-nitroaniline 6330 J
(43B)	111-91-1	bis (2-chloroethoxy) methane 2330 J		99-09-2	3-nitroaniline 6330 J
				100-01-6	4-nitroaniline 5000 J

December 1983

BZTO104(e)012028



ORGANICS ANALYSIS DATA SHEET

Laboratory Name: CE-EMST  
Lab Sample ID No: \_\_\_\_\_  
Sample Matrix: Soil (Empty bottle)  
Data Release Authorized By: G. Colovos

Case No: 1973  
QC Report No: 1973  
Contract No.: 68-01-6783  
Date Sample Received: 12/2/83

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: \_\_\_\_\_

DATE ANALYZED: \_\_\_\_\_

PERCENT MOISTURE: \_\_\_\_\_

PP #	CAS #	ug/l or ug/kg (circle one)
(2V)	107-02-8	acrolein
(3V)	107-13-1	acrylonitrile
(4V)	71-43-2	benzene
(6V)	56-23-5	carbon tetrachloride
(7V)	108-90-7	chlorobenzene
(10V)	107-06-2	1,2-dichloroethane
(11V)	71-55-6	1,1,1-trichloroethane
(13V)	75-34-3	1,1-dichloroethane
(14V)	79-00-5	1,1,2-trichloroethane
(15V)	79-34-5	1,1,2,2-tetrachloroethane
(16V)	75-00-3	chloroethane
(19V)	110-75-8	2-chloroethylvinyl ether
(23V)	67-66-3	chloroform
(29V)	75-35-4	1,1-dichloroethene
(30V)	156-60-5	trans-1,2-dichloroethene
(32V)	78-87-5	1,2-dichloropropane
(33V)	10061-02-6	trans-1,3-dichloropropene
	10061-01-5	cis-1,3-dichloropropene
(38V)	100-41-4	ethylbenzene
(44V)	75-09-2	methylene chloride
(45V)	74-87-3	chloromethane
(46V)	74-83-9	bromomethane
(47V)	75-25-2	bromoform
(48V)	75-27-4	bromodichloromethane
(49V)	75-69-4	fluorotrichloromethane
(50V)	75-71-8	dichlorofluoromethane
(51V)	124-46-1	chlorodibromomethane
(85V)	127-18-4	tetrachloroethene
(86V)	108-88-3	toluene
(87V)	79-01-6	trichloroethene
(88V)	75-01-4	vinyl chloride
	67-64-1	acetone
	78-93-3	2-butanone
	75-15-0	carbonyl sulfide
	519-75-6	2-hexanone
	108-10-1	4-methyl-2-pentanone
	100-42-5	styrene
	108-05-4	vinyl acetate
	1330-20-7	total xylenes

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: 4/7/84

DATE ANALYZED: 9/11/84

PERCENT MOISTURE: \_\_\_\_\_

PP #	CAS #	ug/l or <u>ug/kg</u> (circle one)
(89P)	309-00-2	aldrin 50 J
(90P)	60-57-1	dieldrin 50
(91P)	57-74-9	chlordane 50U
(92P)	50-29-3	4,4'-DDT 50
(93P)	72-55-9	4,4'-DDE 50
(94P)	72-54-8	4,4'-DDD 50
(95P)	115-29-7	alpha-endosulfan 50
(96P)	115-29-7	beta-endosulfan 50
(97P)	1031-07-8	endosulfan sulfate 50
(98P)	72-20-8	endrin 50
(99P)	7421-93-4	endrin aldehyde 50
(100P)	76-44-8	heptachlor 50
(101P)	1024-57-3	heptachlor epoxide 50
(102P)	319-84-6	alpha-BHC 50
(103P)	319-85-7	beta-BHC 50
(104P)	319-86-8	delta-BHC 50
(105P)	58-89-9	gamma-BHC (lindane) 50
(106P)	53469-21-9	PCB-1242 50U
(107P)	11097-69-1	PCB-1254 50U
(108P)	11104-28-2	PCB-1221 50U
(109P)	11141-16-5	PCB-1232 50U
(110P)	12672-29-6	PCB-1248 50U
(111P)	11096-82-5	PCB-1260 50U
(112P)	12674-11-2	PCB-1016 50U
(82B)	8001-35-2	toxaphene 50U J

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: \_\_\_\_\_

DATE ANALYZED: \_\_\_\_\_

PERCENT MOISTURE: \_\_\_\_\_

PP #	CAS #	ug/l or <u>ug/kg</u> (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachloro- dibenzo-p-dioxin 46

EPA Sample Number  
S2557

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: CE-EMST  
Lab Sample ID No: 00196 (032284V04)  
Sample Matrix: Water (Empty bottle)  
Data Release Authorized By: G. Colovos

Case No: 1973  
QC Report No: 1973  
Contract No.: 68-01-6783  
Date Sample Received: 12/2/83

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)  
DATE EXTRACTED/PREPARED: \_\_\_\_\_  
DATE ANALYZED: 3/22/84  
PERCENT MOISTURE: \_\_\_\_\_

PP #	CAS #		<u>ug/l</u> or ug/kg (circle one)
(2V)	107-02-8	acrolein	10U J
(3V)	107-13-1	acrylonitrile	2U
(4V)	71-43-2	benzene	3U
(6V)	56-23-5	carbon tetrachloride	3U
(7V)	108-90-7	chlorobenzene	4U
(10V)	107-06-2	1,2-dichloroethane	3U
(11V)	71-55-6	1,1,1-trichloroethane	4U
(13V)	75-34-3	1,1-dichloroethane	3U
(14V)	79-00-5	1,1,2-trichloroethane	3U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	4U
(16V)	75-00-3	chloroethane	8U
(19V)	110-75-6	2-chloroethylvinyl ether	3U
(23V)	67-66-3	chloroform	3U
(29V)	75-35-4	1,1-dichloroethene	10U
(30V)	156-60-5	trans-1,2-dichloroethene	4U
(32V)	78-87-5	1,2-dichloropropane	4U
(33V)	10061-02-6	trans-1,3-dichloropropane	3U
	10061-01-5	cis-1,3-dichloropropane	3U
(38V)	100-41-4	ethylbenzene	2U
(34V)	75-09-2	methylene chloride	10U
(45V)	74-87-3	chloromethane	10U
(46V)	74-83-9	bromomethane	13U
(47V)	75-25-2	bromoform	2U
(48V)	75-27-4	bromodichloromethane	3U
(49V)	75-69-4	fluorotrichloromethane	38U
(50V)	75-71-8	dichlorofluoromethane	28U
(51V)	124-48-1	chlorodibromomethane	4U
(85V)	127-18-4	tetrachloroethene	3U
(86V)	108-88-3	toluene	3U
(87V)	79-01-6	trichloroethene	4U
(88V)	75-01-4	vinyl chloride	5U
	67-64-1	acetone	3U
	78-93-3	2-butanone	1U
	75-15-0	carbonyl disulfide	6U
	519-78-6	2-hexanone	9U
	108-10-1	4-methyl-2-pentanone	2U
	100-42-5	styrene	2U
	108-05-4	vinyl acetate	3U
	1330-20-7	total xlenes	2U J

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)  
DATE EXTRACTED/PREPARED: 4/7/84  
DATE ANALYZED: 9/11/84  
PERCENT MOISTURE: \_\_\_\_\_

PP #	CAS #		<u>ug/l</u> or ug/kg (circle one)
(89P)	309-00-2	aldrin	0.05U J
(90P)	60-57-1	dieldrin	0.05U
(91P)	57-74-9	chlordane	0.5U
(92P)	50-29-3	4,4'-DDT	0.05U
(93P)	72-55-9	4,4'-DDE	0.05U
(94P)	72-54-8	4,4'-DDD	0.05U
(95P)	115-29-7	alpha-endosulfan	0.05U
(96P)	115-29-7	beta-endosulfan	0.05U
(97P)	1031-07-8	endosulfan sulfate	0.05U
(98P)	72-20-8	endrin	0.05U
(99P)	7421-93-4	endrin aldehyde	0.05U
(100P)	76-44-8	heptachlor	0.05U
(101P)	1024-57-3	heptachlor epoxide	0.05U
(102P)	319-84-6	alpha-BHC	0.05U
(103P)	319-85-7	beta-BHC	0.05U
(104P)	319-86-8	delta-BHC	0.05U
(105P)	58-89-9	gamma-BHC (lindane)	0.05U
(106P)	53469-21-9	PCB-1242	0.5U
(107P)	11097-69-1	PCB-1254	0.5U
(108P)	11104-28-2	PCB-1221	0.5U
(109P)	11141-16-5	PCB-1232	0.5U
(110P)	12672-29-6	PCB-1248	0.5U
(111P)	11096-82-5	PCB-1260	0.5U
(112P)	12674-11-2	PCB-1016	0.5U
(82B)	8001-35-2	toxaphene	0.5U J

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)  
DATE EXTRACTED/PREPARED: \_\_\_\_\_  
DATE ANALYZED: \_\_\_\_\_  
PERCENT MOISTURE: \_\_\_\_\_

PP #	CAS #		<u>ug/l</u> or ug/kg (circle one)
(129B)	1746-01-6	2,3,7,8-tetrachloro- dibenzo-p-dioxin	17

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: CE-EMST Case No: 1973  
Lab Sample ID No: 00196 (060584004) QC Report No: 1973  
Sample Matrix: Water (Empty bottle) Contract No.: 68-01-6783  
Data Release Authorized By: G. Colovos Date Sample Received: 12/2/83

SEMIVOLATILE COMPOUNDS

CONCENTRATION: LOW MEDIUM HIGH (circle one)  
DATE EXTRACTED/PREPARED: 07-APR-84  
DATE ANALYZED: 05-JUN-84  
PERCENT MOISTURE: \_\_\_\_\_  
CONC./DILUTION FACTOR: 1.0

PP #	CAS #	ug/l or ug/kg (circle one)	PP #	CAS #	ug/l or ug/kg (circle one)	
(21A)	22-06-2	2,4,6-trichlorophenol	20	(52B)	87-68-3 hexachlorobutadiene	60
(22A)	59-50-7	p-chloro-m-cresol	40	(53B)	77-47-4 hexachlorocyclopentadiene	150
(24A)	95-57-8	2-chlorophenol	30	(54B)	78-59-1 isophorone	60
(31A)	120-83-2	2,4-dichlorophenol	20	(55B)	91-20-3 naphthalene	50
(34A)	105-67-9	2,4-dimethylphenol	20	(56B)	98-95-3 nitrobenzene	120
(57A)	88-75-5	2-nitrophenol	40	(61B)	62-75-9 N-nitrosodimethylamine	250
(58A)	100-02-7	4-nitrophenol	390	(62B)	86-30-6 N-nitrosodiphenylamine	90
(59A)	51-28-5	2,4-dinitrophenol	330	(63B)	621-64-7 N-nitrosopropylamine	120
(60A)	534-52-1	4,6-dinitro-2-methylphenol	240	(66B)	117-81-7 bis (2-ethylhexyl) phthalate	1
(64A)	87-86-5	pentachlorophenol	100	(67B)	85-68-7 benzyl butyl phthalate	60
(65A)	108-95-2	phenol	30	(68B)	84-74-2 di-n-butyl phthalate	2
	65-85-0	benzoic acid	100	(69B)	117-84-0 di-n-octyl phthalate	30
	95-48-7	2-methylphenol	30	(70B)	84-66-2 diethyl phthalate	50
	108-39-4	4-methylphenol	150	(71B)	131-11-3 dimethyl phthalate	40
	95-95-4	2,4,5-trichlorophenol	20	(72B)	56-55-3 benzo(a)anthracene	30
(1B)	83-32-9	acenaphthene	50	(73B)	50-32-8 benzo(a)pyrene	30
(5B)	92-87-5	benzidine	150	(74B)	205-99-2 benzo(b)fluoranthene	110
(6B)	120-82-1	1,2,4-trichlorobenzene	50	(75B)	207-08-9 benzo(k)fluoranthene	40
(9B)	118-74-1	hexachlorobenzene	40	(76B)	218-01-9 chrysene	30
(12B)	67-72-1	hexachloroethane	40	(77B)	208-96-3 acenaphthylene	20
(18B)	111-44-4	bis(2-chloroethyl)ether	60	(78B)	120-12-7 anthracene	30
(20B)	91-58-7	2-chloronaphthalene	40	(79B)	191-24-2 benzo(ghi)perylene	40
(25B)	95-50-1	1,2-dichlorobenzene	30	(80B)	86-73-7 fluorene	30
(26B)	541-73-1	1,3-dichlorobenzene	30	(81B)	83-01-8 phenanthrene	20
(27B)	106-46-7	1,4-dichlorobenzene	30	(82B)	53-70-3 dibenzo(a,h)anthracene	30
(28B)	91-94-1	3,3'-dichlorobenzidine	100	(83B)	193-39-5 indeno(1,2,3-cd)pyrene	30
(35B)	121-14-2	2,4-dinitrotoluene	120	(84B)	129-00-0 pyrene	120
(36B)	606-20-2	2,6-dinitrotoluene	100		62-53-3 aniline	60
(37B)	122-66-7	1,2-diphenylhydrazine			100-51-6 benzyl alcohol	90
(39B)	206-44-0	fluoranthene	50		106-47-8 4-chloroaniline	240
(40B)	7005-72-3	4-chlorophenyl phenyl ether	20		132-64-9 dibenzofuran	40
(41B)	101-55-3	4-bromophenyl phenyl ether	70		91-57-6 2-methylnaphthalene	20
(42B)	39638-32-9	bis (2-chloroisopropyl) ether	30		88-74-4 2-nitroaniline	190
(43B)	111-91-1	bis (2-chloroethoxy) methane	70		99-09-2 3-nitroaniline	190
					100-01-6 4-nitroaniline	150

December 1983

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: CE-EMST Case No: 1973  
Lab Sample ID No: 00178 (060584003) QC Report No: 1973  
Sample Matrix: Water (Empty bottle) Contract No.: 68-01-6783  
Data Release Authorized By: G. Colavos Date Sample Received: 12/2/83

SEMIVOLATILE COMPOUNDS

CONCENTRATION: LOW MEDIUM HIGH (circle one)  
DATE EXTRACTED/PREPARED: 07-APR-84  
DATE ANALYZED: 05-JUN-84  
PERCENT MOISTURE: \_\_\_\_\_  
CONC./DILUTION FACTOR: 1.0

ug/l or ug/kg (circle one)				ug/l or ug/kg (circle one)			
PP #	CAS #			PP #	CAS #		
(21A)	22-06-2	2,4,6-trichlorophenol	20 J	(52B)	87-68-3	hexachlorobutadiene	60 J
(22A)	59-50-7	p-chloro-m-cresol	40	(53B)	77-47-4	hexachlorocyclopentadiene	150
(24A)	95-57-8	2-chlorophenol	30	(54B)	78-59-1	isophorone	60
(31A)	120-83-2	2,4-dichlorophenol	20	(55B)	91-20-3	naphthalene	50
(34A)	105-67-9	2,4-dimethylphenol	20	(56B)	98-95-3	nitrobenzene	120
(57A)	86-75-5	2-nitrophenol	40	(61B)	62-75-9	N-nitrosodimethylamine	250
(58A)	100-02-7	4-nitrophenol	390	(62B)	86-30-6	N-nitrosodiphenylamine	90
(59A)	51-28-5	2,4-dinitrophenol	330	(63B)	621-64-7	N-nitrosopropylamine	120
(60A)	534-52-1	4,6-dinitro-2-methylphenol	240	(66B)	117-81-7	bis (2-ethylhexyl) phthalate	31
(64A)	87-86-5	pentachlorophenol	100	(67B)	85-68-7	benzyl butyl phthalate	2
(65A)	108-95-2	phenol	30	(68B)	84-74-2	di-n-butyl phthalate	5
	65-85-0	benzoic acid	100	(69B)	117-84-0	di-n-octyl phthalate	30
	95-48-7	2-methylphenol	30	(70B)	84-66-2	diethyl phthalate	50
	108-39-4	4-methylphenol	150	(71B)	131-11-3	dimethyl phthalate	40
(1B)	33-32-9	acenaphthene	50	(72B)	56-55-3	benzo(a)anthracene	30
(5B)	92-87-5	benzidine	150	(73B)	50-32-8	benzo(a)pyrene	30
(8B)	120-82-1	1,2,4-trichlorobenzene	50	(74B)	205-99-2	benzo(b)fluoranthene	110
(9B)	118-74-1	hexachlorobenzene	40	(75B)	207-08-9	benzo(k)fluoranthene	40
(12B)	67-72-1	hexachloroethane	40	(76B)	218-01-9	chrysene	20
(16B)	111-44-4	bis(2-chloroethyl)ether	60	(77B)	208-96-3	acenaphthylene	20
(20B)	91-58-7	2-chloronaphthalene	40	(78B)	120-12-7	anthracene	30
(25B)	95-50-1	1,2-dichlorobenzene	30	(79B)	191-24-2	benzo(ghi)perylene	40
(26B)	541-73-1	1,3-dichlorobenzene	30	(80B)	86-73-7	fluorene	30
(27B)	106-46-7	1,4-dichlorobenzene	30	(81B)	83-01-8	phenanthrene	20
(28B)	91-94-1	3,3'-dichlorobenzidine	100	(82B)	53-70-3	dibenzo(a,h)anthracene	30
(35B)	121-14-2	2,4-dinitrotoluene	120	(83B)	193-39-5	indeno(1,2,3-cd)pyrene	30
(36B)	606-20-2	2,6-dinitrotoluene	100	(84B)	129-00-0	pyrene	120
(37B)	122-66-7	1,2-diphenylhydrazine			62-53-3	aniline	60
(39B)	206-44-0	fluoranthene	50		100-51-6	benzyl alcohol	90
(40B)	7005-72-3	4-chlorophenyl phenyl ether	20		106-47-8	4-chloroaniline	240
(41B)	101-55-3	4-bromophenyl phenyl ether	70		132-64-9	dibenzofuran	40
(42B)	39638-32-9	bis (2-chloroisopropyl) ether	30		91-57-6	2-methylnaphthalene	20
(43B)	111-91-1	bis (2-chloroethoxy) methane	70 J		88-74-4	2-nitroaniline	190
					99-09-2	3-nitroaniline	190
					100-01-6	4-nitroaniline	150 J

December 1983

9907 4 January 85  
102

BZTO104(e)012032

EPA Sample Number  
S2568

ORGANICS ANALYSIS DATA SHEET

Laboratory Name: CE-EMSI  
Lab Sample ID No: 178  
Sample Matrix: Water (Empty bottle)  
Data Release Authorized By: G. Colovos

Case No: 1973  
QC Report No: 1973  
Contract No.: 68-01-6783  
Date Sample Received: 12/2/83

VOLATILES

CONCENTRATION: LOW MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: \_\_\_\_\_

DATE ANALYZED: 3/22/84

PERCENT MOISTURE: \_\_\_\_\_

PP # CAS # ug/l  
or ug/kg  
(circle one)

(2V)	107-02-8	acrolein	10U
(3V)	107-13-1	acrylonitrile	2U
(4V)	71-43-2	benzene	3U
(6V)	56-23-5	carbon tetrachloride	3U
(7V)	108-90-7	chlorobenzene	4U
(10V)	107-06-2	1,2-dichloroethane	3U
(11V)	71-55-6	1,1,1-trichloroethane	4U
(13V)	75-34-3	1,1-dichloroethane	3U
(14V)	79-00-5	1,1,2-trichloroethane	3U
(15V)	79-34-5	1,1,2,2-tetrachloroethane	4U
(16V)	75-00-3	chloroethane	8U
(19V)	110-75-8	2-chloroethylvinyl ether	3U
(23V)	67-66-3	chloroform	3U
(29V)	75-35-4	1,1-dichloroethene	10U
(30V)	156-60-5	trans-1,2-dichloroethene	4U
(32V)	78-87-5	1,2-dichlorocyclopropane	4U
(33V)	10061-02-6	trans-1,3-dichlorocyclopentene	3U
	10061-01-5	cis-1,3-dichlorocyclopentene	3U
(38V)	100-41-4	ethylbenzene	2U
(44V)	75-09-2	methylene chloride	10U
(45V)	74-87-3	chloromethane	10U
(46V)	74-83-9	bromomethane	13U
(47V)	75-25-2	bromoform	2U
(48V)	75-27-4	bromodichloromethane	3U
(49V)	75-69-4	fluorotrichloromethane	38U
(50V)	75-71-8	dichlorofluoromethane	28U
(51V)	124-48-1	chlorodibromomethane	4U
(85V)	127-18-4	tetrachloroethene	3U
(86V)	106-88-3	toluene	3U
(87V)	79-01-6	trichloroethene	4U
(88V)	75-01-4	vinyl chloride	5U
	67-64-1	acetone	3U
	78-93-3	2-butanone	1U
	75-15-0	carbonyl sulfide	6U
	519-78-6	2-hexanone	9U
	108-10-1	4-methyl-2-pentanone	2U
	100-42-5	styrene	2U
	108-05-4	vinyl acetate	3U
	1330-20-7	total xylenes	2U

PESTICIDES

CONCENTRATION: LOW MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: 4/7/84

DATE ANALYZED: 9/11/84

PERCENT MOISTURE: \_\_\_\_\_

PP # CAS # ug/l  
or ug/kg  
(circle one)

(89P)	309-00-2	aldrin	0.05U
(90P)	60-57-1	dieldrin	0.05U
(91P)	57-74-9	chlordane	0.5U
(92P)	50-29-3	4,4'-DDT	0.05U
(93P)	72-55-9	4,4'-DDE	0.05U
(94P)	72-54-8	4,4'-DDD	0.05U
(95P)	115-29-7	alpha-endosulfan	0.05U
(96P)	115-29-7	beta-endosulfan	0.05U
(97P)	1031-07-8	endosulfan sulfate	0.05U
(98P)	72-20-8	endrin	0.05U
(99P)	7421-93-4	endrin aldehyde	0.05U
(100P)	76-44-8	heptachlor	0.05U
(101P)	1024-57-3	heptachlor epoxide	0.05U
(102P)	319-84-6	alpha-BHC	0.05U
(103P)	319-85-7	beta-BHC	0.05U
(104P)	319-86-8	delta-BHC	0.05U
(105P)	58-89-9	gamma-BHC (lindane)	0.05U
(106P)	53469-21-9	PCB-1242	0.5U
(107P)	11097-69-1	PCB-1254	0.5U
(108P)	11104-28-2	PCB-1221	0.5U
(109P)	11141-16-5	PCB-1232	0.5U
(110P)	12672-29-6	PCB-1248	0.5U
(111P)	11096-82-5	PCB-1260	0.5U
(112P)	12674-11-2	PCB-1016	0.5U
(82B)	8001-35-2	toxaphene	0.5U

DIOXINS

CONCENTRATION: LOW MEDIUM HIGH (circle one)

DATE EXTRACTED/PREPARED: \_\_\_\_\_

DATE ANALYZED: \_\_\_\_\_

PERCENT MOISTURE: \_\_\_\_\_

998 4 January 85  
PP # CAS # ug/l  
or ug/kg  
(circle one)  
(129B) 1746-01-6 2,3,7,8-tetrachloro-  
dibenzo-p-dioxin 101

S2556

**January Meeting**

RI-EMSC

Case# Nov 1973

22 REPORT NO. 1973

## B. Tentatively Identified Compounds

93 1/8/85

432

~~XXXXXXXXXX~~  
S2557

Case No. 1973

X Report No. 1973

## 2. Transiently Ionized Compounds

(92) 1/8/85

CAS #	Compound Name	Fraction	Scan No. or Retention Time	% Maximum Score Attained Mass Matching Routines (Specificity Purity)	Estimated Concentration (ug/L or ug/kg)
1 822-67-3	2-Cyclohexen-1-ol	BNA	438	887	45J
2 --	Unknown	BNA	517	---	8J
3 29538-77-0	Cyclohexanol, 4-chloro-	BNA	627	759	10J
4 --	trans-				
5 --	Unknown	BNA	760	---	8J
6 --	Unknown	BNA	1719	---	25J
7.					
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402

ORGANIC ANALYSIS DATA SHEET - Page 3

Sample Number  
S2568

Inventory Number RI-EMSC

Case No. 1973

QC Report No. 1973

B. Tentatively Identified Compounds

1/8/85

CAS #	Compound Name	Fraction	Scan No. or Retention Time	% Maximum Score Attained Mass Matching Routine (Specify Purity.)	Estimated Concentration (ug/L or ug/kg)
1	Polysiloxane	VOA	512	926	16J
2	Hexamethyl	VOA			
3	451-88-2 Cyclopentane, 1,1,3-	BNA	388	705	15J
4	Trimethyl				
5	812-67-3 2-Cyclohexen-1-ol	BNA	438	787	25J
6	Unknown	BNA	1715	---	30J
7	123-79-5 Hexanedioic acid, dimethyl	BNA	1904	845	180J
8	diethyl ester				
9					
10					
11					
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472





**JAMES RIVER CORPORATION**  
One Bush Street, San Francisco CA 94104

NOV 02 1987

October 26, 1987

Billie Nolan  
Koppers Company, Inc.  
Legal Services  
436 Seventh Avenue  
Pittsburgh, PA 15219

RE: Wauna, Oregon  
Hazardous Waste Site

Dear Billie:

When we last spoke on September 2, my notes indicate you were to give me a letter after your Mr. Campbell had talked with our technical person, Mr. Crews. That discussion has taken place and I look forward to your letter.

Yours very truly,

R.W. Skirvin  
Counsel

RWS:pw

cc: W.B. Crews - CES, Camas

cc: J. Campbell - Let's discuss.  
11-4-87

Bum 11/3

1060j

BZTO104(e)012038

cc: J. D. Hite  
File Copy  
J. R. Brummett  
G. A. Schultz  
J. M. Montgomery  
J. D. Palmer

# KOPPERS

## Interoffice Correspondence

To T. A. Beatty

From R. F. Simmons

Location K-1001

Location St. Louis, MO.

Subject Monthly Report January 1978

Date February 1, 1978

Wood Treating Chemicals Dept.

### 1 Shipments January Accounting Month

#### (1) Camden, New Jersey Warehouse

Woodtox Preprime Conc.	5 X 55 Gal.
Woodtox Preprime RTU	1 X 55 Gal.
Woodtox 140 RTU	2 X 55 Gal.

#### (2) Enfield, North Carolina Warehouse

Lumbrella 33 Redwood Soft	19 X 55 Gal.
Lumbrella 33 Redwood Soft	162 X 3 Gal.
Lumbrella 15 Yellow	1 X 53 Gal.
Green End Spray 400	2 X 55 Gal.

#### (3) Atlanta, Georgia Warehouse

Lumbrella 33 Clear	15 X 55 Gal.
Lumbrella 33 Redwood Soft	5 X 55 Gal.
Green End Spray 400	1 X 55 Gal.
WTC #71	1 X 515 Lb.

#### (4) Newark, California Warehouse

Liquid Noxtane SSI	20 X 55 Gal.
--------------------	--------------

#### (5) Cotton Valley, Louisiana Blender

Woodtox 140 RTU	834 Gal. Bulk
-----------------	---------------

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_

From \_\_\_\_\_

Location \_\_\_\_\_

Location \_\_\_\_\_

Subject \_\_\_\_\_

Date \_\_\_\_\_

-2-

### (6) Portland, Oregon Blender

Woodtox Preprime RTU	6044 Gal. Bulk
Woodtox Preprime RTU	80 X 55 Gal.
Woodtox 140 T RTU	41 X 55 Gal.
Woodtox 140 T Conc.	1 X 55 Gal.
Redy Coat Penta Conc.	30 X 55 Gal.
Redy Coat Penta RTU	10 X 55 Gal.
Timbertox 40 Conc.	4083 Gal. Bulk
WR 340 Conc.	6 X 408 Lb.

(7) Sauget, Illinois Blender 0

(8) Phoenix, Arizona Blender 0

### (9) St. Louis, Missouri Plant

Woodtox Preprime RTU	24571 Gal. Bulk
Woodtox Preprime RTU	7 X 55 Gal.
Woodtox Preprime Conc.	5 X 55 Gal.
Woodtox 140 RTU	1018 Gal. Bulk
Woodtox 140 Conc.	80 X 55 Gal.
Woodtox S Conc.	10 X 55 Gal.
Penta Wood Pres. RTU	7 X 55 Gal.
Penta Wood Pres. Conc	5 X 55 Gal.
Tritox	4 X 57 Lb.
Timbertreat 625	1 X 55 Gal.
KLB Beam Sealer	12 X 55 Gal.
Liquid Noxtane SSI	1 X 55 Gal.
Green End Sealer	10 X 5 Gal.
Blue Anstrik 50 Conc.	1 X 5 Gal.
WTC #71	5 X 515 Lb.
Dowicide GST Beads	160 X 50 Lb.
Super Noxtane	322 X 100 Lb.
Lumbrella 33 Redwood S	27 X 3 Gal.
Red/Orange End Spray 400	4 X 55 Gal.
Black End Spray 400	2 X 55 Gal.

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_

From \_\_\_\_\_

Location \_\_\_\_\_

Location \_\_\_\_\_

Subject \_\_\_\_\_

Date \_\_\_\_\_

-3-

Penta Stain #502	2 X 5 Gal.
Penta Stain #504	5 X 55 Gal.
Penta Stain #508	4 X 55 Gal.
Penta Stain #509	3 X 55 Gal.

### Penta Shipments January Calendar Month - Lbs

To	Supplier				Total	Jan. Comparison	
	WTC	Monsanto	Reichhold	Vulcan		1977	1976
FPD	-	-	180,927	80,000	260,927	395,335	398,381
Customer	51,600	42,000	93,900	-	187,500	301,893	290,860
WTC	-	-	-	-	-	70,700	67,650
	<u>51,600</u>	<u>42,000</u>	<u>274,827</u>	<u>80,000</u>	<u>448,427</u>	<u>767,928</u>	<u>756,841</u>

### Invoicing (\$) January Accounting Month

	1978	1977	1976
FPD Penta	142,870	176,297	149,592
Customer Penta	49,785	102,211	62,512
WTC Products	<u>131,328</u>	<u>170,369</u>	<u>129,753</u>
Total	<u>323,983</u>	<u>448,877</u>	<u>341,857</u>

### II Raw Materials

Penta - No problems being encountered with distribution either Reichhold or Vulcan. We took into St. Louis a 2,000 Lb. box of Vulcan flakes that was carrier spilled enroute from Vulcan's plant to St. Louis warehousing; the product was exceptionally dark and produced unacceptable Woodtox Preprime upon testing. Conclusion: we will have to scrutinize Vulcan shipments and need to get assay reports and samplings from both Vulcan and Reichhold.

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_

From \_\_\_\_\_

Location \_\_\_\_\_

Location \_\_\_\_\_

Subject \_\_\_\_\_

Date \_\_\_\_\_

-4-

Mc Phillips reports Monsanto continuing production to the end of February. Weather conditions have not permitted much production however, and inventory situation has not been provided as requested, except in very non-descript terms.

Solvents - Oxo bottoms again increases 2¢/Lb; this makes 25% increase since Sept. 1, 1977.

Steel Containers - U. S. Steel making a big howl on reduced profits to justify their position on increase of 5-6% May 1st. Rheem also announced expected increase of about the same on May 1.

Pigments - Cal Ink increase received today effective March 1 ranging from 4¢/Lb. to 22¢/Lb. Average per Lb. increase 8¢.

### III Inventory & Expenses

December closing inventory	630,939
January purchases	
Raw Materials	107,410
Containers	8,758
(Resale Penta	191,493)
January raw material converted to finished goods	
	101,575
January estimated cost WTC products sold	111,000
January estimated closing inventory	636,107
February estimated closing inventory	650,000
March estimated closing inventory	670,000
April estimated closing inventory	670,000
Actual physical inventory year end	
St. Louis	439,388
All other WTC locations	273,701
January Plant Expenses	
Detail	
130 Safety	273
170 Rent	25
190 Office Expenses & Svcs	599
270 Telephone	383
290 Postage	14
331 Tankcars	(289)

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_

From \_\_\_\_\_

Location \_\_\_\_\_

Location \_\_\_\_\_

Subject \_\_\_\_\_

Date \_\_\_\_\_

-5-

350/351 Repairs & Maint.	113
370 Stationary & Printing	34
390/392 Direct Operating Expense	455
520 Prof. Svcs (Traffic & Lab.)	468
170 Whse. Rent	1232
390 Whse. Op. Expense	660
395 Whse. Freight	1149
391 Tote Bins	1692
Chem. Pumps	1205

### IV Sales Forecast

	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>
FPD Penta	170,000	200,000	200,000
Customer Penta	160,000	175,000	200,000
WTC Products	<u>175,000</u>	<u>200,000</u>	<u>200,000</u>
	505,000	575,000	600,000

### V Assistance Requirements

1. Sales - Weather has been a plague for two months. Situation has to improve!
2. To our situation we have no solution if Dow discontinues EC-7 pills as scheduled. It is bound to cost plenty to convert to using block EC-7 for Liquid Noxtane, if possible at all.

### VI General Comments

December closing physical reported. Terry Franklin, plant worker, laid off Feb. 10. Cecelia Wright, office, retired end of January.

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_

From \_\_\_\_\_

Location \_\_\_\_\_

Location \_\_\_\_\_

Subject \_\_\_\_\_

Date \_\_\_\_\_

-6-

### VII Travel & Meetings

#### Januray

3-4 Bud Harris - Pittsburgh photographer

12 & 20 - Monsanto, scrap penta inspection

30 & 31 - Harry Fry, Orrville, quality assurance inspection (to our knowledge, no plant gigs.)

#### February

2-3 - Newark, CA (LN-SSI production quality problems) and visit suppliers.

6 - Reichhold, Tacoma, Wa.

7-8 - Portland, OR Plant - Safety seminar, supplier visits.

R. F. Simmons

RFS/pdc

CC: B Stuart  
K Adams  
C Brooks  
H Hollis  
J. D. Hite

~~McGill~~  
Dunson  
**KOPPERS**  
C Smith  
Interoffice Correspondence

3/22  
AK

W. H. Conley

Location K-724

Subject Monthly Report -  
February, 1984

From D. F. Marion

Location K-724

Date March 9, 1984

Listed below are the major items covering the month of February, 1984.

1. During February, all three arsenic acid cars were utilized to the maximum. UTLX-85653 and GATX-74970 were shipped to Jones-Hamilton on 2/7 and 2/14, respectively. UTLX-78581 was shipped 2/14 and 2/27 to Valpo. The UTLX-85653 car has been unloaded at Jones-Hamilton and is enroute to Conley. It should arrive in Conley the week of 3/5/84 for loading. The other two cars are in transit and should arrive at Valpo and Jones-Hamilton the week of 3/5/84 for unloading.

2. During February, we again shipped 75% high purity arsenic acid to Corning's plants in Martinsburg, WV and Charleroi, PA. We also received orders for March from those two plants as well as the Corning plant in Danville, VA. Thus, thru March, excluding the small quantity of Strategic Inventory material shipped in January, we will have shipped Corning approx. 330,000 pounds of 75% high purity arsenic acid. Their 1984 blanket purchase order only estimated 500,000 pounds for the entire year and I'm confident we'll surpass that amount. I believe we are currently getting 100% of the business in Charleroi, PA, Martinsburg, WV and Danville, VA. In the near future, Hooker Horton and I plan on getting together to discuss the strategic inventory program for Conley. At that point, I will pursue other Corning locations for us to ship to.

Bill Baldwin is currently working with the people from the Corning plant at Charleroi on cleaning out one of their arsenic acid storage tanks.

In addition, Doug Myers called on the GTE plant in Central Falls, RI and he was advised that the 1984 blanket order for that plant was mailed to Koppers by Frank Lyons, the purchasing agent. Pam Armbruster called on the GTE plant in Versailles, KY and will visit the North American Phillips plant in Danville, KY. She also visited Salsbury Labs in Charles City, Iowa and is optimistic that we'll get an order from them in the near future.

Also, Pete Williams from Woolfolk Chemical called me and ordered a load of technical grade, filtered, arsenic acid for delivery on 3/1/84. This material will be sold at \$.40/lb. FOB Conley.

Also, per Joe Kusar, contracts have been finalized with Langdale and Hoover and PB&S has been offered 500,000 pounds of technical grade, filtered, arsenic acid for distribution. PB&S material will be moved via Chem. Lehman or Kennan and PB&S will pay for the tanker clean out after each shipment. Conley is to advise costs to wash out tanker and

735  
K-S FEB 2



On Feb. 23, Glenn Knowles and Doug Steven of American Chrome visited Pittsburgh to discuss their new chromic acid plant in Corpus Christi, TX. The plant will be completely constructed by early March and start-up will begin immediately thereafter. Per Doug Steven, American Chrome will move chromic acid into the domestic market at whatever price level it takes. They are extremely anxious to see our chromic acid unloading system and participate in our business. I believe we must address this situation very thoroughly.

8. Duty Drawback Claim #8 was liquidated in February and we received a check for \$15,641.41. Thus, we have received checks covering all outstanding claims. To date, we have received checks totaling \$214,916.66 for claims 1-10. Claim #11, for approx. \$8,000 covering exports for the fourth quarter of 1983, will be filed with the U.S. Customs Service in early March. At that point, we will have covered all exports from mid-1979 thru 1983.

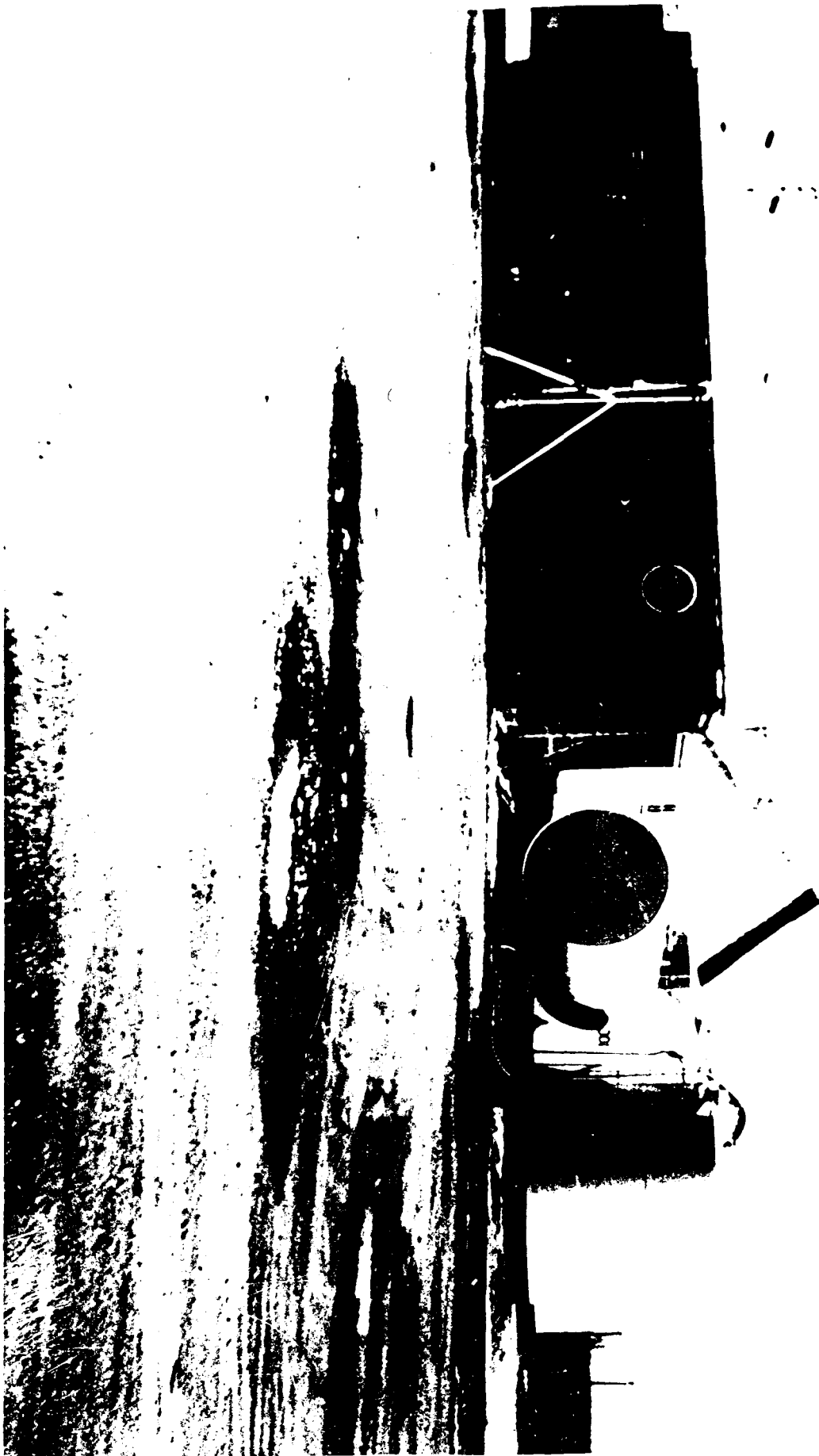
9. A proposal was received by John Palmer in St. Louis covering the dilution of Woodtox Preprime by Time Oil in Portland. A separate memo regarding the proposal from Time Oil has been issued. John Palmer will be visiting both Portland, Neil Wallis and Seattle, Bob Abendroth, during the week of 3/5/84 to try to wrap things up with Time. When we have finalized the Time Oil situation, we will again pursue the consignment agreement with Union Oil on mineral spirits.

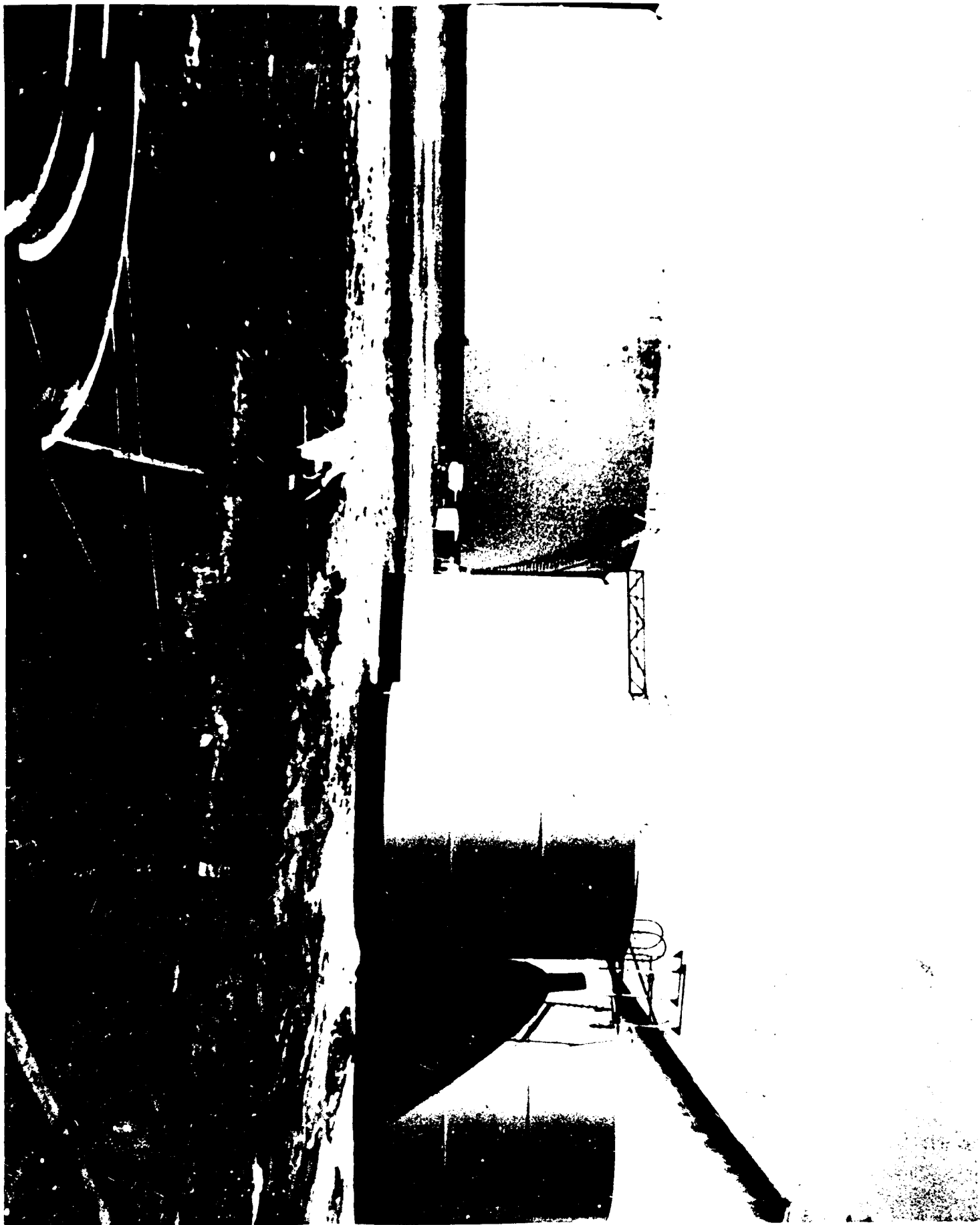
10. On 2/22, I received the new pricing for liquid azide, liquid noxtane SS-1, and sapstain control chemical T-1 from Dan Gilbert of Jones-Hamilton. A separate sheet showing 1983 and 1984 costs was finalized 2/28/84 and circulated for review. The new Jones-Hamilton costs were actually lower and thus the 1984 product costs were lower as shown on the comparison sheet. These costs, along with the selling prices, will be reviewed with Mary Lou Beck, John Palmer and Joe Kusar to calculate gross margins and absorption rates for the WTC products produced at Jones-Hamilton in Newark, CA.

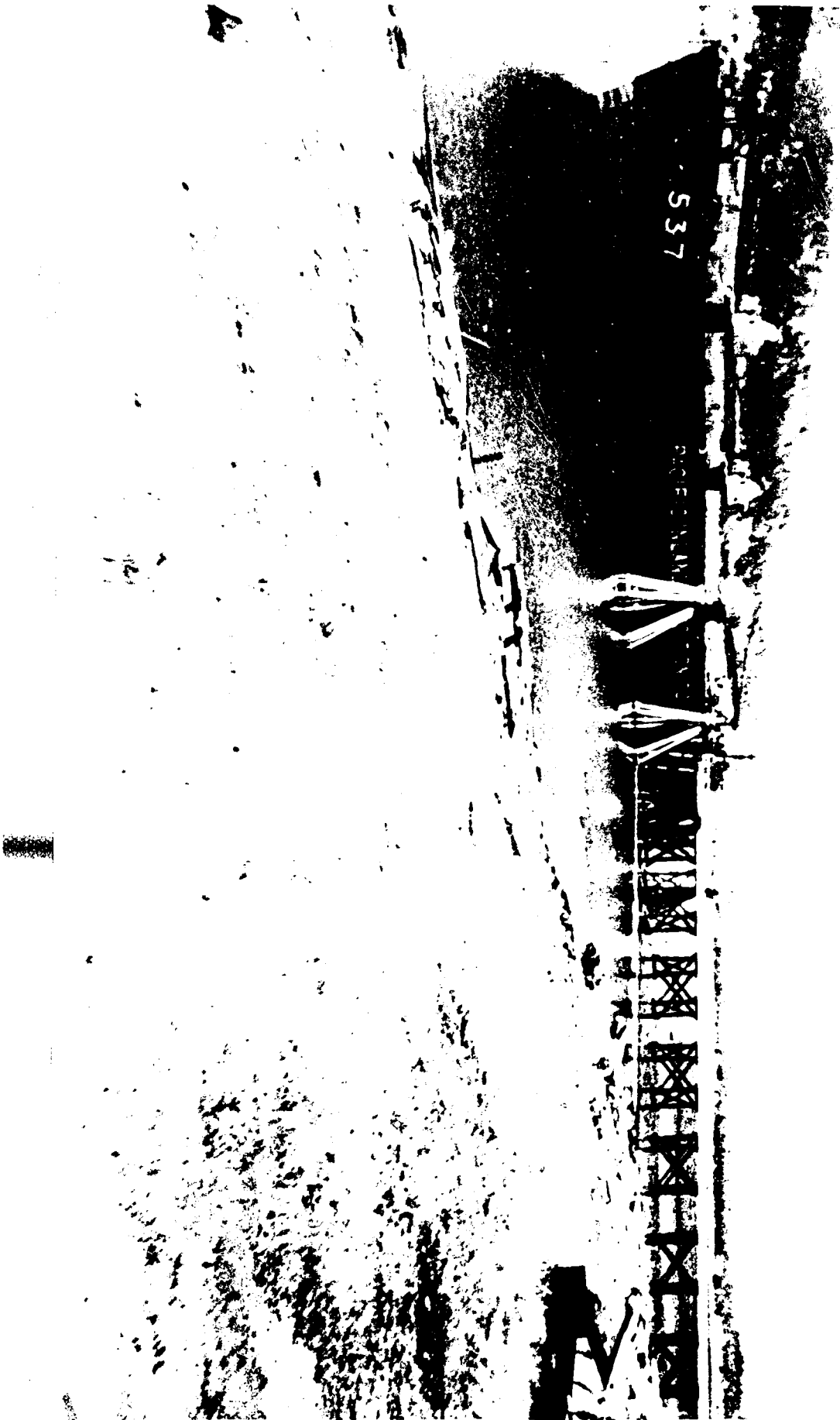
11. On 2/21 and 2/22, Jim Lamb, George Meanor, Dick Cook, Glenn Schultz, John Palmer, Steve Shields and I met in Valparaiso to discuss the Dricon expansion. The meeting was extremely productive and finalized several items. A process flow sheet with specifications, as well as completed drawings for pouring concrete floors and dykes, should be available by the end of February or early March. We should be able to start pouring concrete the week of 3/5/84. Equipment orders will also start to be placed. Currently, only the belt conveyor and heaters have been ordered. Also, the chiller has been received from Orrville, Ohio and a technical representative from Trane has been contacted to come out and inspect the unit to insure its adequacy for the new plant expansion.

12. During my visit to Valpo on 2/21-22, I also reviewed the two open AFE's on the Stock Beam Distribution Center. Both AFE's are nearly complete and probably will be closed in March. We are currently getting quotes for a fence to provide some security around the pole building. We are also looking at different options for security services for Valparaiso.







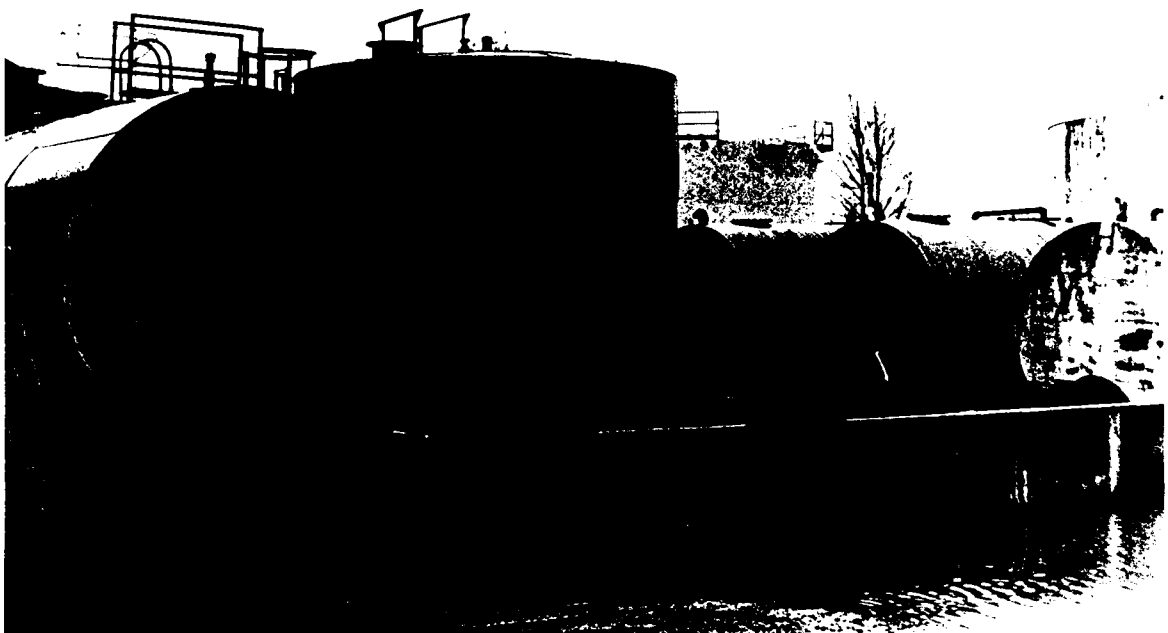


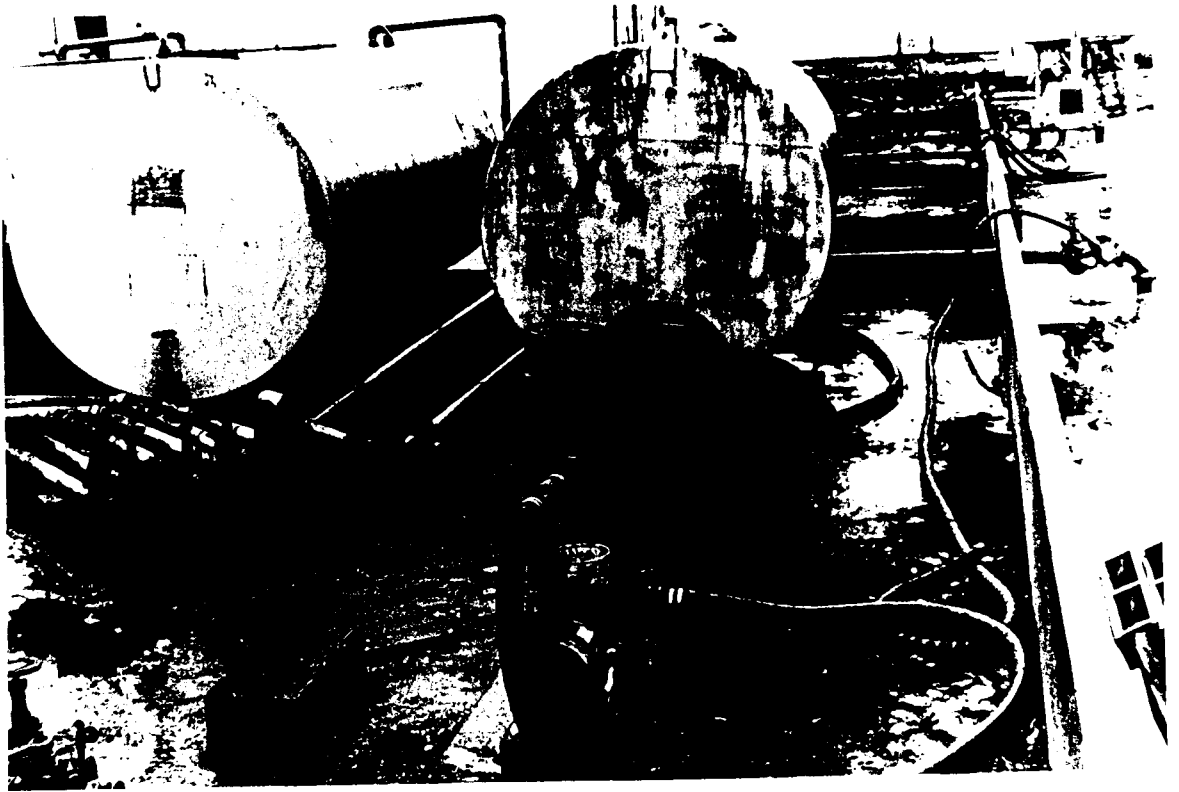












AMENDED SCHEDULE

**TERMINAL:** TIME OIL CO., Portland, Oregon.

**DATE OF AGREEMENT:** March 1, 1967  
August 1, 1970 amended schedule.

**INITIAL TERM OF AGREEMENT:** April 1, 1967 to March 31, 1972.

**OPERATOR:** TIME OIL CO.

**CUSTOMER:** WOOD TREATING CHEMICALS CO.

**PRODUCTS TO BE STORED:** Raw materials in bulk, drums and bags for wood preservatives.  
  
Finished products in bulk and drums.  
  
Also, such other raw materials and finished products specified by the Customer and accepted by the Operator.

**FACILITIES:** Operator will furnish Customer the following facilities:  
  
Storage tanks - one (1) tank with a shell capacity of approximately 38,000 gallons, three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags. *6 tanks why 13?*

**SERVICES:** Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.  
  
Operator shall deliver the finished products into storage, trucks and/or railroad cars.  
  
Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

**HANDLING AND TRANSFER CHARGES:** The only charges for the facilities and services herein are the following:  
  
\$615.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.  
  
One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

CHARGES: cont.

1. Woodtox Preprime RTU
2. Woodtox 140 RTU
3. Presstreat
4. Woodtox 109 RTU
5. Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

1. Timbertox 40 Concentrate
2. WR 340 Concentrate
3. Woodtox Preprime Concentrate
4. Woodtox 140 Concentrate
5. Inhibitor L
6. Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9 (a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective August 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A.FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

On page 2, Paragraph 3, line 6. The amount \$5.8125 shall be substituted for the amount of \$4.25 stated therein.

On page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator".

On page 5, Paragraph 8, line 2. The following shall be substituted for Paragraph 8 in its entirety. "Customer's representative shall have access to the truck and rail car loading rack, tanks and warehouse covered by this agreement, as a matter of course, but all other areas of Operator's terminal facilities shall be closed to Customer's representatives except when accompanied by a representative of Operator. While on Operator's terminal premises, Customer's representative shall comply at all times with any rules established from time to time by Operator in connection with the operation of the terminal."

On page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefor.

On page 8, Paragraph 13 (a), the following shall be substituted therefor:

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, walkout, or injunction, whether or not any such delays within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this agreement or the consumption, sale, use or end use of the products or any product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension. At Customer's option, the period specified for processing and/or delivery of the products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during any suspension period shall be performed or made during such extension, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension and, in either event, the contract shall otherwise remain unaffected."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for fines or penalties imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement. Customer shall also reimburse Operator for all attorneys fees and costs of suit incurred in the defense of any suit brought against Operator for pollution proved to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement.

All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

*[Signature]*

TIME OIL CO., Operator

By *R. D. Abendroth*  
R. D. Abendroth, President

Witness:

*Charles L. Wright*

WOOD TREATING CHEMICALS CO.

By *Lowell E. Suttler*  
Asst. Secretary

## SCHEDULE

**TERMINAL:** TIME OIL CO., Portland, Oregon

**DATE OF AGREEMENT:** March 1, 1967

**INITIAL TERM OF AGREEMENT:** March 1, 1967 to February 29, 1972.

**OPERATOR:** TIME OIL CO.

**CUSTOMER:** WOOD TREATING CHEMICALS CO.

**PRODUCTS TO BE STORED:** Mineral spirits with additives.

**FACILITIES:** Operator will furnish Customer the following Facilities:

**Storage Tanks:** Three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of additives on pallets in drums and bags. Additives being pentachlorophenol in bags and Customer's additive #316 in drums.

### **SERVICES:**

#### **Storage and handling:**

Operator shall receive the Products from tank cars and/or transport trucks and shall deliver such Products into storage tanks.

Operator shall deliver the Products and commodities into transport trucks and/or tank cars. Transport trucks to be driver loaded.

Operator shall receive additives from freight cars and/or trucks.

Operator shall blend additives for mixing with mineral spirits at a temperature not to exceed 180°F.

### **CHARGES:**

The only Charges for the Facilities and Services herein are the following:

\$440.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One-half cent (.005) per gallon on all liquid products received at the terminal with 200,000 gallons minimum receipts guaranteed annually, to be billed at the 1st of each month for the prior months' receipts and paid by Customer within 10 days after receipt of invoice, and plus -

One-half cent (.005) per gallon on all liquid products shipped from the terminal with 200,000 gallons minimum shipments guaranteed annually to be billed at the 1st of each month for the prior months' shipments and paid by Customer within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9(a) and 13(c) of the Agreement to which this Schedule is annexed and of which it is a part.

## AGREEMENT

THIS AGREEMENT, made and entered into this 1st day of March, 1967, by and between TIME OIL CO. (hereinafter referred to as "Operator"), a corporation incorporated and existing under the laws of the State of Washington, and WOOD TREATING CHEMICALS CO. (hereinafter referred to as "Customer"), a corporation organized and existing under the laws of the State of Missouri.

### WITNESSETH:

For and in consideration of the mutual covenants and conditions contained herein, it is agreed as follows:

#### A. FACILITIES.

1. Operator shall provide and furnish to Customer during the term of this Agreement facilities, storage tanks, blending tanks, equipment, improvements and warehouse space as set forth in the Schedule attached hereto and as set forth in this Agreement (all hereinafter called "Facilities").

2. ~~Operator shall retain possession of the Facilities and shall keep and maintain the same in good order and repair and clean and fit for the storage and handling of the Products.~~ Customer shall have the right to inspect the Facilities and the Products stored therein at all times during the hereinafter defined Regular Hours, and during other reasonable times, ~~but no such inspection shall relieve Operator of any of its obligations under this Agreement.~~ Operator shall advise Customer in writing in advance of any changes or alterations in or to the Facilities (excluding, however, maintenance and repairs) which are used for the receipt, storage, blending, handling or redelivery of the Products.

#### B. SERVICES.

1. Operator shall provide and furnish to Customer during the term of this Agreement any and all labor and services necessary or reasonably incidental to receive, store, handle, blend and redeliver the Products at, to and from the Facilities in a safe, efficient, clean and prompt manner (all hereinafter called the "Services").



2. Operator shall receive the Products from trucks and rail cars, store the same in the storage tanks, transfer such Products to the blending tanks as directed by Customer, and redeliver such Products into trucks and rail cars, as and when directed by Customer. Operator shall follow the procedures outlined in the booklet entitled "Monsanto Warehousing and Terminaling Unified Procedures" and all reasonable amendments thereof and additions thereto, applicable to the Products involved. A copy of such booklet is attached hereto as Exhibit A and made a part hereof. Operator shall keep complete and accurate records of the type and quantity of the Products received into, transferred out of, and remaining in said Facilities at all times and of all shipments of the Products made at Customer's request, and such records shall be open to inspection by Customer at all reasonable times. Operator shall make reports to Customer with respect to such receipts, shipments and inventories, at such times and in such manner as may be reasonably prescribed by Customer.

3. The Services shall be performed from 7:00 a.m. to 4:30 p.m., five days per week, Monday through Friday, except for the holidays hereinafter mentioned, herein called the "Regular Hours." The holidays are New Year's Day, Memorial Day, Independence Day, Labor Day, Veteran's Day, Thanksgiving Day and Christmas. Upon the request of Customer, Operator shall perform such services beyond Regular Hours at an additional charge of \$ 11.15 per man hour.

C. PAYMENTS. So long as Operator shall meet its obligations hereunder, Customer shall make payments to Operator during the term of this Agreement according to the Charges on the attached Schedule.

D. GENERAL.

1. Neither Operator, nor any person or party claiming by, through or under Operator, shall ever have or assert any right, title, claim, lien or interest in or to any of the Products.

2. In no event, anything in this Agreement to the contrary notwithstanding, does Operator intend to lease, sublease or assign to the Customer all or any part of the Facilities referred to herein, and neither this Agreement, nor any provision thereof, shall be so construed.

3. Operator shall indemnify and hold harmless Customer from and against any and all liabilities, claims, actions, damages, losses, costs or expenses arising out of injury to or death of any person or damage to or loss or destruction of any property, caused by or connected with: (a) any negligence, or wrongful act or omission of Operator, its employees or agents in the receipt, storage, handling or redelivery of the Products, or any of them; (b) the performance or nonperformance of any of its obligations or operations under this Agreement; or (c) any default of Operator hereunder.

4. Operator shall obtain and maintain, at its expense, during the term of this Agreement, the following insurance in insurance companies satisfactory to Customer:

- (a) Workmen's compensation insurance in an amount equal to the limit of liability and in the form prescribed by the laws of Oregon, for all Operator's employees engaged in any operations under this Agreement. In the event that any employees are not protected by a workmen's compensation statute, Operator shall provide employer's liability insurance in an amount not less than \$100,000 for injury to or for death of any one employee, and subject to the same limitation for each employee, in an amount not less than \$300,000 on account of any one accident.
- (b) Public liability insurance sufficient to cover the obligations assumed by Operator pursuant to Section D.3 of this Agreement and claims for injury to or death of persons or damage to property arising from any activities or operations of Operator under this Agreement in amounts of:
  - (i) not less than \$150,000 for injury to or death of any one person and not less than \$500,000 in respect to any one accident; and
  - (ii) not less than \$100,000 for damage to or destruction of property on account of each accident.

Operator shall furnish Customer with certificates of insurance which certificates shall provide that the foregoing insurance coverage shall not be terminated or reduced without the insurance carrier first giving Customer ten (10) days' prior written notice thereof.

5. Operator shall be liable and responsible for any loss, destruction, spoilage, spillage, pollution, evaporation, shrinkage, line-loss, slingage, discoloration or contamination of, or damage to, any Products arising out of its receipt, storage, handling, blending, mixing or redelivery thereof, or of any of the Services performed or to be performed hereunder resulting from the negligence or wrongful act or omission of Operator, its employees, agents or representatives, or default of Operator under this Agreement.

6. In the event that the Facilities are partially or totally damaged or destroyed or become unfit by reason of fire, explosion, accident, casualty or any other <sup>besides the control of Operator</sup> (similar) cause, or if any of the Facilities are taken or condemned by eminent domain proceedings (all of the foregoing being hereinafter for convenience collectively called "Casualty") so that the same shall be rendered unsuitable or unavailable for the receipt, storage, handling and redelivery of any of the Products, Operator shall immediately notify Customer thereof. Not later than ten (10) days after the occurrence of such Casualty, Operator shall also notify Customer as to whether the Facilities will be restored to their former condition within a period of time not longer than six (6) months measured from the date of such Casualty. If such notice is not given, or if given and the Facilities are not restored by the end of said six (6) month period, Customer may terminate this Agreement at any time thereafter upon notice to Operator, and thereupon Customer shall be relieved of all duties and obligations hereunder.

7. (a) Losses of any Product for which Operator is responsible hereunder shall be determined monthly at the end of each month, commencing with the date of the first receipt of such Product by Operator hereunder, and also, at the time any abnormal loss occurs or is discovered. The extent of loss shall be computed by deducting the total withdrawals of such Product during the period for which the accounting

is made, plus the stock of such Product on hand at the end of such period, from the sum of the total receipts of such Product during such period plus the stock of such Product on hand at the beginning of such period.

- (b) Operator shall not be liable for actual losses resulting from normal spillage and evaporation not in excess of the loss allowance hereinafter described. The term "loss allowance" shall mean actual losses resulting from normal spillage and evaporation not exceeding  $3/4$  of 1% per month of the aggregate of the receipts per month or  $3/4$  of 1% of the maximum amount of Products stored in any one month, whichever is greater, of any such Product as determined under Section D.9(b) of this Agreement.

*amended*  
8. While on Operator's terminal premises, Customer shall comply at all times with any and all rules established as of the date of this Agreement by Operator in connection with the operation of the terminal. A copy of such rules is attached hereto as Exhibit B to this Agreement. Such rules shall not hereafter be amended except by consent of Customer.

9. (a) If the average wage rate in effect at the terminal for all employees of Operator employed full or part time at the terminal as of the first day of any month shall exceed \$2.71 per hour, then, with respect to such month, the handling and transfer charges set forth in the schedule(s) shall be increased by a percentage equal to 25 per cent (25%) of that percentage of \$2.71 which the excess of the average wage rate of \$2.71 constitutes. "Average wage rate" means the amount derived by dividing (a) the total of (i) the rates for the single-rate classifications of wage rates applicable to Operator's personnel and (ii) the mid-points or wage rates for all rate-range classifications applicable to Operator's personnel by (b) the

number of classifications applicable to Operator's personnel.

- (b) The quantity of Product received into or withdrawn from storage tanks shall be determined by Operator's representatives by checking and gauging said tanks at the time of receipt or withdrawal of said Product. Customer may assist, supervise, or participate in all aspects of such checking and gauging, but in the absence of such participation, gauges taken by Operator shall be conclusive, unless such gauges are proven to be in error. However, quantities delivered to rail tank cars or transport trucks may be determined by reference to mutually acceptable calibration charts of the rail car or truck tanks. The cost of such work done by Operator's representatives or licensed inspectors shall be borne by Customer. In the event of any disagreement as to quantities of Products received, it shall, upon written notice of either party to the other, be submitted to one arbitrator to be appointed by the American Arbitration Association for hearing and decision, in Portland, Oregon, which decision shall be rendered within thirty (30) days from the date the case is submitted, and shall be final and binding upon the parties hereto. The cost and expense of the arbitrator shall be borne equally between the parties hereto and the law of Missouri shall govern the arbitration and award.
- (c) If requested by Customer, Operator will take samples from rail tank cars, automotive tank trucks and storage tanks and deliver such samples to Customer and the cost of containers for such samples paid by Operator and the freight charges for deliveries thereof to Customer shall be reimbursed to Operator by Customer each month. Samples shall be taken in accordance with the procedure specified by Customer.

10. Without relieving Operator from any of its duties or obligations under this Agreement, for each day or portion thereof that:

- (a) The Facilities are unsuitable for the receipt, storage, blending, handling or redelivery of any of the Products by reason of any Casualty or for any other similar or dissimilar reason, and/or
- (b) Operator fails or refuses to provide and furnish the Services,

then, and in either event, the Charges set forth in the Schedule shall be suspended for such period or periods; furthermore, if Operator fails or refuses to redeliver any of the Products within five (5) days after Customer's request therefor, Customer shall have the right to enter upon the Facilities and remove such Products from the storage area.

11. Customer agrees to examine Operator's tanks, pipelines and equipment prior to Customer's acceptance and use of their Facilities hereunder and by such use agrees that said Facilities are acceptable for rendering of the Services referred to herein. Operator may substitute other suitable facilities in lieu of those which are designated hereunder provided Operator pays any costs incurred by Customer in regard to such substitution.

12. Customer shall use the Facilities furnished hereunder for the storage, blending and handling of only the Products and commodities specified in said Schedule; provided, however, that anything in this Agreement to the contrary notwithstanding, Customer shall not store and/or handle or cause to be stored and/or handled in any of these Facilities (a) any commodity other than those listed on such Schedule containing hydrogen sulphide or other corrosive materials, (b) any commodity other than those listed on such Schedule which would in any way be injurious to any of the Facilities, or (c) any commodity other than those listed on such Schedule which would render any of the Facilities unfit, after cleaning, for the proper storage and/or handling of water white oils. Customer shall be responsible for any damages resulting from the storage and/or handling in any of these Facilities of any commodity other than those listed in the Schedule which may not be stored and/or handled therein under the terms hereof.

13. (a) Subject to the terms of Sections 6 and 10 hereof, neither party shall be liable to the other for, and each shall be excused from, any failure of or delay in performance under this Agreement, caused by any acts of God or the public enemy, war, floods, storms, earthquakes, lightning, or other act of the elements, accidental fires, explosion, strikes, labor disturbances, riots, insurrection, civil commotion, governmental acts or regulations, accidents, failure or delay of transportation or delivery facilities or supplies, failure or delay of manufacturers or persons from whom such party is obtaining machinery, equipment, materials or supplies to deliver the same, or any other cause beyond the control and without the fault or neglect of such party, whether similar or not to the foregoing causes. For each day or portion thereof that either party shall fail or be unable to perform by reason of any of the foregoing events, the said Charges set forth in the Schedule shall be suspended for such period or periods. Each party shall, in the event it shall fail or be unable to perform by reason of any of the foregoing events, promptly notify the other party thereof. Upon cessation of any such event, performance shall be resumed promptly and the other party shall be notified immediately thereof.

(b) Should the County or City, in which Operator's Facilities are located, or any other government agency, local or federal, prohibit operation of any then existing Facilities used in performing this Agreement, or shall in any way deprive Operator of the right to use any such Facilities or any property in connection therewith, or shall require the construction of additional facilities to be used in performing this Agreement, this Agreement shall terminate at the option of Operator, unless Customer shall pay for the cost of replacing any such Facilities or property of

which Operator was deprived, or for the cost of construction of such additional facilities, or for any other expenses necessary to meet the requirements of such government agency.

- (c) The cost of any Armed Guard Services and/or other protective services or facilities required by Customer or by any government agency shall be for the account of Customer.

14. Operator shall bill Customer monthly in advance and Customer agrees to pay Operator within 10 days after presentation of invoice. All payments hereunder shall be made to Operator at its office at 12005 N. Burgard St., P. O. Box 03117, Portland, Oregon 97203, or at such other place as Operator may notify Customer in writing.

15. Customer agrees promptly upon expiration or termination of this Agreement, to remove all of its Products, either bulk or packaged, from Operator's premises. All such Products not removed within 60 days after the expiration or termination of this Agreement may be sold at auction by Operator and Operator shall return to Customer the proceeds of any such sale, less the amount owed Operator by Customer under the terms of this Agreement and Operator's reasonable expenses in selling said Products.

16. (a) The initial term of this Agreement shall commence as of March 1, 1967 and, if not earlier terminated as herein provided, shall end on February 29, 1972. Upon the expiration of the initial term of this Agreement, this Agreement shall be automatically renewed for a term of five years, and automatically renewed thereafter for successive terms of five years each; provided, however, that either party, at its option, shall have the right to terminate this Agreement at the end of its initial term or at the end of any renewal term by furnishing written notice to the other party at least one year prior to the designated termination date.



16. (b) Provided that Customer may, at its option, terminate this Agreement at any time during the initial term of this Agreement by making a payment to Operator which is equal to Operator's total expenditures for storage, blending tanks, heating elements, warehouse improvements or improvements to any such Facilities which were expended by Operator for the purpose of furnishing storage or blending tanks and Facilities to Customer, less 20% of the total expenditures for each full year that this Agreement has been in full force and effect. The Operator <sup>represents</sup> that the amount expended covering the above is \$\_\_\_\_\_.

(c) Should Operator fail or refuse to discharge any of its obligations under this Agreement, Customer may, at its option and in addition to any other remedies provided for herein, terminate this Agreement immediately upon giving notice to Operator.

17. Should Customer go into bankruptcy, voluntary or involuntary, or be placed in the hands of a receiver, State or Federal, then, and in any such event, the minimum monthly storage and handling charges for the whole unexpired term hereof together with all accrued charges, shall, at the option of Operator, become immediately due and payable. In any such event, Operator shall also have the right, at its option, to terminate this Agreement and, after giving 15 days' notice to Customer, Operator may sell all or any portion of such Products, at public or private sale, but Operator may not be purchaser at such sale or sales. Customer shall pay for and indemnify Operator against its reasonable expenses of such sale, including reasonable attorney's fees, incurred by Operator for the sale of Customer's Products as above provided, for storage, handling Services or other amounts due and owing Operator. Any proceeds of such sale less any amounts due and owing from Customer to Operator under this Agreement and the reasonable expenses of such sale, shall be promptly remitted by Operator to Customer.

18. In the event Customer decides to reduce the quantity or eliminate the handling, blending or storage of any of the Products so that the Facilities are not used or required, Operator shall, at Customer's request, use all reasonable efforts, and otherwise cooperate with Customer, to find and make arrangements with another party or parties to utilize such unused or unrequired Facilities to the extent and as designated by Customer, Operator shall, however, have the right to establish reasonable fees and charges in connection with such arrangements. Customer shall be entitled to a credit against all fees (but not exceeding any amounts due from Customer) to the extent of payments made by such other party or parties pursuant to said arrangements.

19. Customer shall pay any and all taxes, charges and/or assessments on or with respect to the Products, Operator shall pay any and all taxes, charges and/or assessments on or with respect to the Facilities and/or Services.

20. Operator recognizes that Customer utilizes secret processes in its manufacturing and accordingly Operator agrees that it will not disclose or divulge, without the written consent of Customer, the identities or quantities of Products which are received, blended, handled or redelivered by Operator hereunder or the names of customers to whom delivery of such Products or other products is scheduled or made.

21. Operator is not and shall not act or purport to act as an employee, agent or representative of Customer, but is and shall act as an independent contractor.

22. Operator shall obtain and maintain all legally required state and local licenses and permits required for construction, maintenance or operation of the Facilities and/or the Services or Operator's performance of this Agreement.

23. Operator agrees to assume liability for any demurrage on rail equipment or truck equipment, which occurs directly as a result of Operator's operations. Any demurrage accruing on rail equipment or truck equipment, through no fault of Operator shall be paid by Customer; provided, however, Operator shall, in good faith, furnish Customer with all evidence and information known to Operator with respect to the facts, circumstances and causes connected with rail or truck demurrage.

24. Except for any transfer or assignment, in whole or in part by Customer to the Monsanto Company or to any subsidiary company in which Customer owns or controls at least a 50% interest or to an associated company in which the Monsanto Company owns or controls at least a 50% interest, neither party shall transfer or assign this Agreement, or any of its rights hereunder, in whole or in part, without the prior written consent of the other party, and any attempt to do so without such consent shall be void. Subject to the foregoing, this Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

25. Except as otherwise provided in this Agreement, any notice required or permitted to be given under this Agreement shall be in writing and shall be sufficiently given when delivered in person or when deposited in the United States mails (registered or certified), postage prepaid, addressed as follows:

If to Operator,  
addressed to:

Time Oil Co.  
5150 Wilshire Boulevard  
Los Angeles, California 90036

and a copy to:

12005 N. Burgard Street  
P. O. Box 03117  
Portland, Oregon 97203

If to Customer,  
addressed to:

Wood Treating Chemicals Co.  
5137 Southwest Avenue  
St. Louis, Mo. 63110  
Attn: R. M. Morris

or to such other address as may be specified from time to time in a written notice given by such party. Both parties agree to acknowledge in writing receipt of any notice delivered in person. Routine operating instructions, requests, directions and other similar routine communications shall not require a notice as above provided and may be given in such manner and to such persons as may be customary or practicable.

26. This Agreement constitutes the sole agreement between the parties pertaining to the Facilities and/or Services.

27. The section and paragraph headings in this Agreement are inserted for convenience only and are in no way to be construed as part of this Agreement or as a limitation of the scope of the particular sections or paragraphs to which they refer.

IN WITNESS WHEREOF, the parties hereto have duly executed this Agreement as of the day and year first hereinabove written.

ATTEST:

*[Signature]*  
*Attest. Secy*

ATTEST:

\_\_\_\_\_

TIME OIL CO.

BY

*RO Alundt & Pies*

WOOD TREATING CHEMICALS CO.

BY

\_\_\_\_\_

A S S I G N M E N T

WHEREAS, under date of March 1, 1967 and amended schedule of August 1, 1970 the undersigned WOOD TREATING CHEMICALS CO. entered into an agreement with TIME OIL CO., a Washington corporation, a copy of which is attached hereto marked Exhibit "A" and

WHEREAS, KOPPERS COMPANY, INC. of Pittsburg, Pennsylvania has purchased a majority of the wood preservative business assets of WOOD TREATING CHEMICALS CO.,

NOW, THEREFORE, in consideration of the mutual promises and covenants contained in this assignment, acceptance thereof by KOPPERS COMPANY, INC. and consent thereto by TIME OIL CO., WOOD TREATING CHEMICALS CO. hereby assigns to KOPPERS COMPANY, INC. all right, title and interest in and to the attached contract, accounts payable thereunder, property therein described and rights therefrom ensuing, subject to all the conditions thereof.

IN WITNESS WHEREOF, the undersigned has executed this assignment, this 1<sup>st</sup> day of December, 1974.  
as of

WOOD TREATING CHEMICALS CO.

By  1102

ACCEPTANCE OF ASSIGNMENT

Assignee KOPPERS COMPANY, INC. hereby accepts the above assignment and agrees to assume and fulfill all conditions and obligations therein contained and contained in the agreement attached hereto marked Exhibit "A" on the part of the Assignor WOOD TREATING CHEMICALS CO. therein to be fulfilled.

KOPPERS COMPANY, INC.

By  1102

CONSENT TO ASSIGNMENT

TIME OIL CO. hereby consents to the assignment of that certain contract entered into between TIME OIL CO. and WOOD TREATING CHEMICALS CO. dated March 1, 1967 and amended August 1, 1970 by amended schedule, a copy of which TIME OIL CO. acknowledges is hereto attached.

TIME OIL CO.

By Newton P. Leach - VP Pres.



State of Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

To: RCB Industrial Waste Section cc: PDO  
WDL

Date: Feb. 16, 1971

From: WDL

Subject: IW 3-0 Time Oil Co.

Visited Time Oil Company's Terminal at 12005 N. Burgard this afternoon and talked to the plant engineer, Neil \_\_\_\_\_. Time Oil has a dock and a fairly good size tank farm storing:

1. Gasoline
2. Jet Fuel
3. Diesel
4. Raw turpentine from paper mills
5. Other miscellaneous products.

When they draw water from tank bottoms they allow it to flow on the ground. But they maintain they have no effluent going into the river, drainage ditch or storm sewer.

But they may be saturating the soil with oil over a long period.

They also lease a tank to PacMar Services to store wastes from refinery separators, ships tank cleaning, etc.

WDL



## DEPARTMENT OF ENVIRONMENTAL QUALITY

TERMINAL SALES BLDG. • 1234 S.W. MORRISON ST. • PORTLAND, OREGON 97205

January 12, 1972

Time Oil Company  
Portland Division  
12005 N. Burgard Street  
Portland, Oregon 97203

Attention: Mr. N. P. Lesh, Vice President

Gentlemen:

Re: WDP File #86780

The Department of Environmental Quality staff has reviewed your plans and proposals set forth in meetings in connection with proposed facilities for the collection and treatment of tank water draw waste waters at Time and Bell Oil Terminals. It is understood Bell Oil is a wholly owned subsidiary of Time Oil Co.

The basic components of the system are as follows:

1. A water draw box at each tank having water draw fittings (8 tanks at Time Terminal and 4 tanks at the Bell Terminal).
2. Drainage piping to centrally located sampling sumps in the tank farm area where waters may be sampled before discharge. (Two at the Time Terminal and 1 at the Bell Oil Terminal.)
3. A portable Fram-Aker oil/water separator coupleable to tank water draw fitting, discharging treated water to collection system and returning oil to the tank.
4. Three dry well stations each with sampling platform and sump (overflow to dry well).

COPY



Time Oil Co.

2.

January 12, 1972

Approval is herewith granted for the proposed construction and facilities subject to confirmation by the Environmental Quality Commission.

Approval of the above facilities does not preclude discharge of treated waters to the sanitary sewer by arrangement with the city of Portland.

If you have any questions, please contact this office.

Very truly yours,

L. B. Day  
Director

WDL/lb



State of Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

cc: CKA, Jim Sweeney  
Jind 7/2/74

To: R. Nichols, ~~REG. Libert~~, ~~R. Zitzka~~

Date: June 28, 1974

From: LDPatterson

Subject: WQ - Time Oil Company - Multnomah County

This is in reference to an inspection of the Time Oil Company facilities located in the Rivergate District.

The large majority of the property is sand which allows storm water to percolate into the ground. All paved areas drain to collection sumps which connect to a closed private sewer system. Water from this private system, including tank draw water, is pumped to a large oil storage tank. The liquid from this tank is periodically pumped through a portable oil-water separator from which the water is discharged to the City of Portland's sanitary sewer.

The oil dock has been concreted, curbed and plumbed to carry any oil spillage to the same oil storage facility.

Pac-Mar has been contracted to remove waste oils from the separator.

The Time Oil Company has no discharges to the Willamette River. The facility appears to be clean, neat and well maintained.

An NPDES Permit will not be required for this facility.

*Should get a state permit to this facility when we get time.*

*[Signature]*

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



PHONE 286-1611

# TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 03117, ST. JOHNS STATION, PORTLAND, OREGON 97203

July 2, 1974

Mr. L. Sawyer, Director of Water Quality  
Department of Environmental Quality  
Room 205 Terminal Sales Building  
1234 S. W. Morrison St.  
Portland, Oregon 97205

State of Oregon  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
**RECEIVED**  
JUL 3 1974  
WATER QUALITY CONTROL

Dear Mr. Sawyer:

On August 1, 1972 we were issued a Waste Discharge Permit #1198, which expires December 31, 1974. Your file number was 28780, application number 1460, receiving stream Willamette River, County of Multnomah.

I talked to William Lesh in your office today, relative to the procedure to renew this permit when it expires. He told me that perhaps we did not need a permit.

In our operation here we do not discharge any water or wastes into the Willamette River. In 1972 we installed a water draw system for all of our tanks and this water is piped to a slop tank, together with any storm water from around our loading rack and a small portion of our paved yard. The water and oil that is collected in the slop tank is periodically ran through our Fram Oily Water Separator. The oil collected in this operation is disposed of or returned to storage and the water which contains less than 100 ppm ether soluble oil is dumped into the City of Portland sewer.

With our method of operation we would like to know if we need a NPDS permit or a State of Oregon permit, since we dump nothing in the river and the storm water from a small area in our paved yard is processed through our collection system.

If you need any additional information, please contact me.

Yours very truly,

Newton P. Lesh

NPL/s

BZTO104(e)012080

January 31, 1975

Time Oil Company  
P. O. Box 03117  
Portland, Oregon 97203

Attention: Mr. Newton P. Lesh  
Vice President

Re: WQ - Time Oil Company  
Multnomah County

Gentlemen:

The Department has reviewed Time Oil Company's application for a State of Oregon Water Pollution Control Facilities Permit. Because your wastewater is discharged to the City of Portland sewerage system, we have determined that a permit will not be required for your terminal. Further processing of your permit application has, therefore, been terminated.

If you have any questions relative to this procedure, please feel free to contact Mr. Dick Nichols of this office at 238-8471.

Very truly yours,

KESSLER R. CANNON  
Director

E. J. Weathersbee, Administrator  
Northwest Region

RJN:cs

cc: Water Quality Division, DEQ

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



WQ- 78: LXP-45 Northwest Region  
**TIME OIL CO.**

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

March 14, 1975

Department of Environmental Quality  
1234 S. W. Morrison Street  
Portland, Oregon 97205

Dear Sirs:

Attached detailed report of oil spill at the Time Oil Company terminal facility in Portland, Oregon is submitted in compliance with paragraph (1)(e), section 47-015, of the Oregon Administrative Rules Compilation.

Sincerely,

*John P. Denham*  
John P. Denham  
Environmental Control Engineer

JPD/jf

Copy to:

Region X -  
Environmental Protection Agency  
Attn: Mr. Jim Willman  
1200 Sixth Avenue  
Seattle, Washington 98101

NORTHWEST REGION OFFICE  
**RECEIVED**

MAY 16 1975

DEPARTMENT OF  
ENVIRONMENTAL QUALITY

ENCLOSURE 3

BZTO104(e)012082

STATISTICS

<u>Conditions:</u>	<u>Diesel</u>	<u>Bbls.</u>
On barge prior to discharge		15,244
Discharged into tank 55021		11,334
On barge prior to discharge to tank 29508		3,910
Discharged into tank 29508 before rupture		1,837
Isolated on barge at time of rupture		2,073
In tank 29508 before receipt		24,470
In tank 29508 after rupture		5,301
On barge after rupture		7,480
In tank 15002 after rupture		4,843
In tank 5312 after rupture		3,283
In tank 5313 after rupture		1,737

Loss:

Quantity in tank 29508 before receipt	24,470
Plus quantity discharged into tank 29508 before rupture	1,837
Less quantity in tank 29508 after rupture	5,301
Less quantity recovered	17,343
Equals loss of	3,663

SUBJECT: OIL SPILL AT TIME OIL COMPANY TERMINAL - PORTLAND, OREGON

On March 8, 1975 Heating oil and Diesel on board PAC Barge 25 were being discharged to terminal storage tanks. Heating oil discharge operation started about 0700 hours and was completed at 1020 hours. Diesel discharge operation began immediately thereafter. Spill occurred, during the diesel operation, at tank 29508 and was due to tank rupture.

Operation took place as follows. Approximately 11,334 of the 15,244 total net barrels on board barge was received into tank 55021. At approximately 1530 hours, tank 55021 was filled and pumping to tank 29508 was started. When pumping to tank 29508 began, Neil Gallagher (Terminal Superintendent) departed for home. Otto Saylor and Wayne Schmidt remained on duty. At approximately 1630 hours, Schmidt was inspecting the pipelines being used and was within 100 feet of tank 29508 when the vertical weld on the second ring from the tank bottom ruptured. Schmidt observed the initial rupture (approximately 6 inches in length) instantly spread to the full six (6) foot length of the vertical weld. Schmidt immediately caused barge pumping to stop. The bargeman isolated remaining product on board, then opened all empty barge tanks and started receiving tank 29508 product back on the barge. Superintendent was notified, returned to the terminal at about 1650 hours, and effected emergency actions. Empty tank 15002, adjacent to tank 29508, was opened and began receiving product by gravity flow through an 8 inch line. Tank 5313, already containing approximately 121 bbls. of diesel and on a common line with tank 15002, was also opened. The U.S. Coast Guard office was informed of the rupture at approximately 1700 hours.

Spill accumulation had flowed to a low area adjacent to tank 5312. A portable 3 inch transfer pump was put into operation and spill recovery operations began about 1730 hours with the pumping into empty tank 5312. Another 2 inch pump was put into operation at a second low spot by tank 5313 and pumping started to that tank. Two additional personnel were called in to work. The Willamette Tug and Barge Company was called to deploy the company's on hand oil containment boom just in case any oil might reach the river. Boom was deployed by 1830 hours.

PO-2 Melvin Harris of the U.S. Coast Guard was on site. He requested his office call the Portland Fire Department, then took pictures of the tank rupture. The plant entry gate had been closed as part of the emergency operations procedure, and a company employee was standing by it with instructions to permit only necessary company personnel or emergency vehicles to enter. The fire department arrived at approximately 1930 hours and surveyed the area.

At approximately 2200 hours, when the product level in tank 29508 had been decreased somewhat and there was no possible chance of injury to personnel, a ladder was placed against the tank and cedar shingles were driven into the crack. Spill was then reduced to a minimum.

At 0015 hours, March 9th, the product in tank 29508 was below the rupture. Transfer to the barge was stopped. Barge was gauged. Gauge showed barge had received approximately 7,480 barrels. When tank rupture occurred, there was 2,073 barrels remaining on the barge. 1,837 barrels had, therefore, been discharged into tank 29508 before the rupture. The 7,480 barrels of product returned to the barge and the 2,073 barrels previously on board were then pumped to tank 16804. Final product transfer was completed at 0500 hours on March 9th.

Meanwhile, portable pumps were continually being moved to different locations where other low spots existed and all visible spill accumulations were recovered by 1700 hours on March 9th. Recovery operations continued on March 10th. Beginning at 0700 hours, holes were hand dug in many places and any small quantities of oil were transferred to tank 5312. Oil sorbent pads were simultaneously deployed throughout the area and pick-up accomplished. A backhoe was then brought in and large holes dug throughout the area in search of remaining oil accumulation. None could be found. As a final recovery effort on March 11th, certain areas were flooded with fresh water. No oil accumulation resulted.

Overall corrective action started March 12th when complete removal and disposal of all ground in the spill area was begun. Ground is being replaced with newly purchased soil. Tank is to be repaired and tested prior to being returned to service.

Synopsis: At approximately 1630 hours on March 8, 1975, a diesel oil spill occurred at the Time Oil Co. terminal in Portland, Oregon. Spill resulted from a tank rupture. Emergency procedures were effected in accordance with Operations Manual. Spill was contained by secondary containment diked area inside property boundaries. At no time did any product reach navigable waters. 3,663 bbls. of diesel oil were lost.



July 26, 1978

Time Oil Company  
P.O. Box 03117  
Portland, Oregon 97203

Attention: Mr. Newton Lesh  
Terminal Manager

Re: AQ - Time Oil Company  
Multnomah County  
NWR-AQ-78-188  
NOTICE OF VIOLATION

Gentlemen:

Department personnel have verified that gasoline products are being stored at Time Oil Company, 12005 N. Burgard, Portland, Oregon 97203, in volumes greater than 40,000 gallons without approved vapor emission control devices on the storage tanks. This is in violation of Oregon Administrative Rules (OAR) Chapter 340, Section 28-050 (1).

You or your representatives are requested to attend an office conference at our offices located at 522 SW 5th Avenue, Portland, Oregon, on August 29, 1978, at 10:00 a.m. At this time please be prepared to present a program and time schedule which will bring your facility into compliance.

If the Department can be of any assistance to you in this matter, please call me at 229-5295.

Sincerely,

James R. Close  
Environmental Specialist  
Northwest Region

JRC/eh  
Enclosure  
cc: Air Quality Division, DEQ  
Regional Operations, DEQ

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

PHONE 285 2400  
CABLE ADDRESS TIMOIL

February 22, 1982

Department of Environmental Quality  
Attn: Mike Ebeling  
P.O. Box 1760  
Portland, Oregon 97207

Dear Mr. Ebeling:

This is a request for assignment of a "Generator Identification Number". It is submitted, as required by OAR 340-63-210, for use by Time Oil Co. at 12005 North Burgard in Portland, Oregon 97203.

Three (3) Hazardous Wastes, as defined in ORS 459.410 (6), may periodically be generated at this terminal location. They are listed below with identifications as shown in 40 CFR 261.32 and 261.33.

<u>NO.</u>	<u>WASTE</u>
K051	API Separator Sludge
K052	Tank bottoms (leaded)
P090	Pentachlorophenol

Enclosed is copy of EPA I.D. number ORD009597543 assigned to this installation. Please send "Generator Identification Number" to me.

Sincerely,

*John P. Denham*  
John P. Denham  
Hazard Control Manager

Dept. of Environment Quality  
**RECEIVED**  
FEB 21 1982

JPD/jam

Encl. a/s

BZTO104(e)012087

VOLUNTARY CLEANUP SECTION  
PROJECT STATUS AND ISSUE REPORT

REPORTING PERIOD: May, 1992

PROJECT: Time Oil Company Terminal, North Portland

This

PROJECT MANAGER: Mike Kortenhof

PROJECT TYPE: Responsible Party Initiated Letter Agreement

BACKGROUND:

Time Oil Company owns and operates a petroleum products storage terminal on approximately 52 acres located in the Rivergate area of North Portland. It is situated on the east bank of the Willamette River at 12005 North Burgard Road. Terminal operations began at this site in the 1940's. The facility, including 30+ above ground storage tanks, has handled jet fuel, gasoline, xylene, toluene, fuel oil, lube oil, butyl alcohol, isobutanol, methanol, Methyl 10, turpentine, pentachlorophenol, fatty acid, lignin liquor and liquid fertilizer.

A Federal Preliminary Assessment was performed for the facility in 1985. Soil contamination was identified resulting from waste oil handling and pentachlorophenol blending operations. The site was referred to the State for further action. Confirmed releases of pentachlorophenol, polychlorinated biphenols, lead, naphthalene and chrysene were identified. The facility is listed by the State as needing further information or investigation.

Time Oil Company ran a pentachlorophenol (penta) blending operation for Koppers Company on a portion of the subject property from 1967 to 1982. Operations consisted of heating and mixing penta granules with paraffin wax, mineral spirits and other solvents to produce various woodtreating products. The raw materials arrived on site by rail-tank car and truck. The product was shipped in 55 gallon drums and by tank truck.

Soil contamination in the area surrounding the penta operation was discovered in March of 1982. The tanks, piping and related equipment were removed. In 1985 surface soils throughout the penta operations area were removed to a depth of 1.5 feet and disposed of at the hazardous waste landfill at Arlington. Shortly thereafter, the Environmental Protection Agency banned land disposal of penta waste. Time Oil began investigating methods to treat the soil on site with the goal of reducing penta concentrations to 0.5 mg/kg or less. An additional 3,400 cubic yards of penta contaminated soil, with an average penta concentration of 950 mg/kg, was excavated in 1989 and stockpiled in a bermed, lined and covered soil pile.

Soil with penta concentrations as high as 574 mg/kg remains in place at and below the water table (13 feet) in the area of the excavation. Higher levels of contamination remain in place under one corner of an adjacent warehouse. Sampling results show that the groundwater has been impacted in the immediate area of the blending operations, although the magnitude and extent of groundwater contamination is ambiguous.

Time Oil has identified bioremediation as a possible treatment method for the stockpiled soil, although full scale field tests have shown that it will not reach the 0.5 mg/kg goal. Time Oil has asked DEQ to consider alternative cleanup levels so they can start soil treatment operations as soon as possible.

PROJECT STATUS SUMMARY:

Time Oil entered a Voluntary Cleanup Agreement with the Department of Environmental Quality (DEQ) on July 17, 1991. They submitted a report describing work relating to the penta cleanup on December 6, 1991. A site visit was made by Mike Kortenhof on January 30, 1992. DEQ completed review of the report and prepared detailed comments on April 8, 1992. As a result of the review it was determined that the stockpiled soil was a listed hazardous waste that was not stored in compliance with Resource Conservation and Recovery Act (RCRA) regulations. Compliance with those regulations is expected to include site investigation and cleanup requirements. The project was been referred to the RCRA program of DEQ for resolution of those issues.

PROJECT ISSUE SUMMARY:

Time Oil is proposing on-site treatment and disposal of a listed hazardous waste (F027). Applicable Resource Conservation and Recovery Act (RCRA) regulations must be evaluated before comments on this proposal can be prepared.

The fate of penta contaminated soil remaining under the warehouse and below the water table is unknown.

The magnitude and extent of groundwater contamination due to the penta release is undefined.

The releases identified during the 1985 Preliminary Assessment still require additional investigation.

Time Oil  
Project Status and Issue Report  
May, 1992  
Page 3 of 3

QUARTERLY PLANNING:

April - June, 1992:

Work on this project under the voluntary cleanup program has been deferred pending resolution of the RCRA compliance issues. Further work on this project will be considered upon identification of RCRA mandated site investigation and cleanup requirements.

C:RC Hamilton  
(1/30/89)

86-102

PHONE 285-2400  
CABLE ADDRESS: TIMOIL  
(FAX) 206-283-8036

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
LOS ANGELES



# TIME OIL COMPANY

2737 WEST COMMODORE WAY  
P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233  
SEATTLE, WASHINGTON 98124-0447

January 27, 1989

William F. Giarla  
Koppers Company, Inc.  
436 Seventh Avenue  
Pittsburgh, PA 15219

Re: Meeting - Portland, Oregon  
March 1, 1989

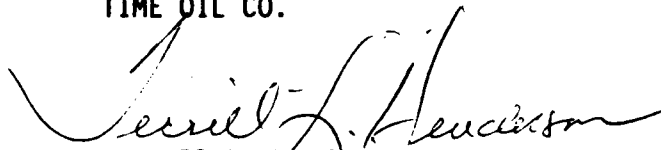
Dear Bill:

This is to confirm our discussion yesterday in which we agreed that March 1, 1989 would be an agreeable date to meet at Time Oil Co.'s facility at 12005 North Burgard, Portland, Oregon. The purpose of the meeting to be for us to review the remedial measures that have been and will be taken at the facility in order to remove the pentachlorophenol in the soil surrounding the tanks that had been used to store Koppers' products and to resolve the division of responsibility for the costs being incurred in this cleanup.

Please let me know what time would be most convenient for you to meet. We look forward to meeting you and working with Koppers to resolve this matter in a manner that will be fair to both companies.

Very truly yours,

TIME OIL CO.

  
Terrill L. Henderson  
Corporate Counsel

TLH:mw

cc: Robert D. Abendroth  
Fred Proby

0063C

BZTO104(e)012091

Koppers Company, Inc.  
436 Seventh Avenue  
Pittsburgh, PA 15219  
Telephone 412-227-2000

86-117

# KOPPERS

January 13, 1989

Mr. Terrill L. Henderson  
Corporate Counsel  
Time Oil Company  
2737 West Commodore Way  
Seattle, WA 98199-1233

Re: Northwest Terminal Property Time Oil

Dear Terry:

Enclosed please find a check from Koppers Company in the amount of \$59,185.55. This represents Koppers' share of the costs incurred through September 19, 1988 for the investigation and cleanup of the above site.

I look forward to talking with you soon concerning the scheduling of a meeting to discuss the allocation of responsibility for the remaining work Time Oil plans for the property.

Very truly yours,



William F. Giarla  
412-227-2635

Enclosure

7 P C E	Vendor No.	Div.	Our Audit No.	Your Invoice No.	Inv. Date		Invoice Amt.	Discount	Net Amt. Payable
					Mo.	Day			
7	125619011	100	10090100280		01	09	59185.55	0.00	59185.55

Detach Before Depositing



Beazer Materials and Services, Inc./Koppers-Pittsburgh, PA 15219

Vendor No.	Div.	Our Audit No.	Your Invoice No.	Inv. Date		Invoice Amt.	Discount	Net Amt. Payable
				Mo.	Day			
125619011	100	10090100280		01	09	59185.55	0.00	59185.55

Detach Before Depositing

BEAZER MATERIALS AND SERVICES, INC./KOPPERS  
PITTSBURGH, Pa. 15219

80-28  
815

NO. 0607809

**PAY**

FIFTY NINE THOUSAND ONE HUNDRED EIGHTY FIVE AND 55/100 ONLY

To the order of

TIME OIL CO

BOX 24447 TERM ANNEX

SEATTLE

WA 98124-0447

Date

JANUARY 11 1989

Pay this amount

\$59185.55

CENTERRE BANK  
ROLLA, MD

AD-396 9/88



⑈0607809⑈ ⑆081502899⑆ 09 9789 ⑈ Dean McAllister

BZTO104(e)012094

# KOPPERS

December 21, 1988

Terrill Henderson, Esq.  
Time Oil Company  
2737 West Commodore Way  
P.O. Box 24447  
Terminal Station  
Seattle, Washington 98124-0047

Re: Northwest Terminal

Dear Mr. Henderson:

This will confirm our conversation of last week in which I informed you that Koppers Company has reviewed your letter of September 19, 1988 and decided how to proceed with respect to the proposal you described.

In our past conversations and your letter of September 19, 1988 you indicated that on January 23, 1986 Koppers agreed to pay one-half of the costs for the cleanup and related work on the above property. After our conversation we reviewed our files, both in the Law Department and in our environmental subsidiary, in an effort to confirm that statement.

We were unable to find anything indicating an agreement as broad as the agreement you describe. We did, however, find a letter dated February 19, 1986 from Robert D. Abendroth of Time Oil which indicated that Koppers and Time had reached a more limited agreement. Mr. Abendroth's letter states:

"During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to pay one-half the cleanup costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future commitments. Time concurs with this approach."

December 21, 1988  
Terrill Henderson, Esq.  
2.

Mr. Abendroth's letter convincingly evidences Time's understanding of this more limited agreement between Koppers and Time, and nothing in our file indicates that any Koppers' personnel took exception to Mr. Abendroth's characterization of the agreement.

It seems clear, then, that Koppers did not make a blanket agreement to share all costs of cleanup for the site. The agreement between Koppers and Time was that Koppers would share equally the cost of cleanup and related work which Time incurred or to which Time committed by February 19, 1986. Commitments for additional cost sharing were clearly deferred pending "further coordination" between Koppers and Time.

In light of this agreement to share past costs, Koppers will reimburse Time Oil for one-half of the investigation and cleanup costs referenced in your letter of September 19, 1988. I have requested that a check be issued to Time in the amount of \$59,185.55.

With respect to the future costs, the same turnover in personnel which required first hand research into the details of any agreement between our companies now requires an explanation of why Koppers should agree to pay one-half of all the cleanup costs for the Northwest Terminal site. As I told you in our conversation, the current Koppers' management personnel responsible for such costs would like to meet with Time Oil personnel in order to hear Time Oil's views on this subject, and to discuss the issue generally. I will contact you following our next Environmental Claim Review Meeting in order to schedule a meeting between our companies to discuss "future commitments".

Several weeks ago I received a copy of a letter from Mr. Abendroth to Koppers Company's President, Frederick Moore. Mr. Abendroth stated that Koppers Company appeared to be ignoring Time's communications during the last year. Much has happened here at Koppers Company in the last year, including a lengthy takeover battle, a subsequent merger, a divestiture of business units representing almost one-half of the company, and reductions in staff. The level of activity and the turnover in personnel have made communications difficult. My expectation is that future events here at Koppers Company will allow for smoother communications.

December 21, 1988  
Terrill Henderson, Esq.  
3.

(Ironically, Mr. Abendroth's letter also asserted that Koppers had entered into a blanket cost sharing agreement, an assertion contradicted by Mr. Abendroth's February 19, 1988 letter.) -

Please feel free to call me if you have any questions or comments concerning the above.

Very truly yours,



William F. Giarla  
412-227-2635

WFG:km

cc: R. Abendroth



SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
LOS ANGELES



# TIME OIL COMPANY

2737 WEST COMMODORE WAY  
P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233  
SEATTLE, WASHINGTON 98124-0447

PHONE 285-2400  
CABLE ADDRESS: TIMOIL  
(FAX) 206-283-8036

September 19, 1988

Mr. Bill Giarla  
Koppers Company, Inc.  
Koppers Building, Room 750  
Pittsburg, Pennsylvania 15219

Dear Mr. Giarla:

On July 27, 1988 you and I discussed the matter of the costs incurred in the cleanup of Koppers' pentachlorophenol at Time Oil's Northwest Terminal in Portland. Since that time, Time Oil has been searching for an economic and effective method of disposing of the problem. In that regard, enclosed is a preliminary work plan prepared by Ecova Corporation for the cleanup of the pentachlorophenol contaminated soils. Although Time Oil is still in the process of evaluating the merits of the work plan, we anticipate following it subject to approval by the Oregon Department of Environmental Quality.

The cost of the proposed cleanup and related work is estimated at \$400,000. Pursuant to the January 23, 1986 agreement between Koppers and Time Oil, Kopper's share would be \$200,000.

As a reminder, Time Oil has spent \$118,371.10 to date on investigation and cleanup of our mutual problem. Of this we have invoiced you \$54,780.28 by invoices dated 3/6/86 and 4/17/87 (copies enclosed). We have not yet received payment for those invoices. Also enclosed is our invoice dated 9/21/88 for \$4,405.27, which brings Kopper's total share of moneys spent to date to \$59,185.55.

Very truly yours,

TIME OIL CO.

*Terrill L. Henderson*  
Terrill L. Henderson  
Corporate Counsel

TLH:pjv

Enclosures

0297C

BZTO104(e)012098

**TIME OIL CO.**  
P.O. BOX 24447 TERM. STATION - SEATTLE WA 98124-0447  
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233  
PHONE (206) 285-2400

**INVOICE 091868**

DATE 03/06/86  
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

**ACCOUNT:**

KOPPERS COMPANY INC  
ATTN: DONALD F. MARION  
KOPPERS BUILDING ROOM 750  
PITTSBURGH PA 15219

657	60	123	27831.21
120	9	.	14250.00

-----  
TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT  
IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD.,  
PORTLAND, OREGON.

**EXPENDITURES**

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	<u>55,662.43</u>

**COMMITMENTS**

DEQ PER OAK 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (AMENDMENT 2)	25,000.00+
	<u>84,162.43</u>

50% = 42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL \$42,081.21

Encl. 1

**ACCOUNTS RECEIVABLE**

BZTO104(e)012099

TIME OIL CO.

DEBIT MEMO 020190

BOX 24447 TERM. STATION SEATTLE WA 98124-0447  
2737 WEST COMMODORE WAY SEATTLE WA 98199-1233  
PHONE (206) 235-2400

DATE 04/17/87  
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT:

120 9

12699.07

KOPPERS COMPANY  
Koppers Building - Room 750  
Pittsburgh, PA 15219  
ATTN: JAY STEBBINS

-----  
THIS IS AN ADDITION TO INVOICE # 091363 DATED  
MARCH 6, 1986 FOR \$ 42,081.21 TO CHARGE YOU FOR  
HALF OF EXPENDITURES, PER MUTUAL AGREEMENT, IN  
REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD  
PORTLAND, OREGON.

12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, \$42081.21)  
AND THE UPDATED CHARGES FOR \$ 54730.23 ARE ATTACHED.

INVOICE TOTAL

\$12,699.07

ORIGINAL

BZTO104(e)012100

TIME OIL C  
O. BOX 24447 TERM. STATION SEATTLE WA 98124-0447  
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233  
PHONE (206) 285-2400

INVOICE 056677  
DATE 09/21/88  
REF. 09-03116 CJC

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC  
KOPPERS BUILDING ROOM 750  
ATTN: BILL GIARLA  
PITTSBURGH PA 15219

657 60 123 4405.27

-----  
TO CHARGE YOU FOR 1/2 THE FOLLOWING PWR MUTUAL AGREEMENT IN  
REFERENCE TO CLEAN UP COSTS AT 12005 N BURGARD RD, PORTLAND  
OREGON

EXPENDITURES

11/9/87 SRH-COLLECT AND ANALIZE  
WATER SAMPLES

2810.53

8/31/88 ECOVA-PREPARE PENTA  
CLEANUP WORK PLAN

6000.00

8810.53

50%= 4405.27

4,405.27

INVOICE TOTAL

\$4,405.27



SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
LOS ANGELES



# TIME OIL COMPANY

2737 WEST COMMODORE WAY  
P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233  
SEATTLE, WASHINGTON 98124-0447

11/30 called T. Henderson wcb  
12/1 Called T. Henderson wcb  
12/2 called T. Henderson wcb  
12/8 called T. Henderson wcb

November 17, 1988

Mr. Frederick C. Moore  
President  
Koppers Company, Inc.  
436 Seventh Avenue  
Pittsburgh, Pennsylvania 15219

Dear Mr. Moore:

I am writing to you in hopes of resolving a situation that exists between Time Oil Co. and Koppers before it develops into a needless and costly dispute.

Briefly, the situation arises out of an agreement dated March 1, 1967 under which Time Oil agreed to provide certain labor and services to store and blend wood preservatives containing pentachlorophenol belonging to Koppers Company at our Portland, Oregon terminal. After the agreement was terminated in 1982 it was discovered that the ground at the terminal contains substantial quantities of the product belonging to Koppers. As you know pentachlorophenol is a hazardous substance under federal and state law and gives rise to authority by the federal and state governments to compel cleanup of the product by responsible parties including the owner of the product.

Since the problem first materialized Time Oil has been in contact with Koppers Company and initially there appeared to be willingness on the part of Koppers to work with Time to resolve this problem as inexpensively as possible and without exciting the interest of the federal and state authorities. To that end we met with Koppers personnel on January 23, 1986 in Pittsburgh where an agreement in principle was reached under which the cost of resolving this problem would be shared on a fifty fifty basis.

It is not my purpose here to detail the efforts that Time Oil has undertaken to resolve this environmental problem nor the efforts it has taken to obtain the continued cooperation of Koppers. Suffice it to say here that within the last year and half Koppers Company appears to be simply ignoring the problem and our communications.

0297C

PHONE 285-2400  
CABLE ADDRESS: TIMOIL  
(FAX) 206-283-8036


BZTO104(e)012102

Mr. Frederick C. Moore  
November 17, 1988  
Page 2

I would appreciate anything you might be able to do to advise us as to how this matter may be resolved. My telephone number is (206) 285-2400.

Very truly yours,

TIME OIL CO.

  
Robert D. Abendroth  
Vice President

RDA:TLH:pjv

cc Mr. Bill Giarla ✓  
Koppers Company, Inc.  
Koppers Building, Room 750  
Pittsburgh, Pennsylvania 15219

0297C

BZTO104(e)012103

M E M O R A N D U M

November 9, 1987

TO: Robert Abendroth  
John Luckovich

Seattle  
Seattle

FROM: ✓ John Denham

## Seattle

SUBJECT: PENTACHLOROPHENOL CONTAMINATION - NORTHWEST TERMINAL

Today I contacted Jim Campbell of Keystone Environmental Resources Inc. (412-227-2689) regarding above subject. I again asked that Koppers provide two things:

- a. The results of sample analysis accomplished in their laboratory, which was promised not later than June 1, 1987, plus Koppers recommended solution to the contamination problem and;
- b. A check in the amount of \$54,780.28 as their payment of half the costs incurred to date.

Campbell said they would do so.

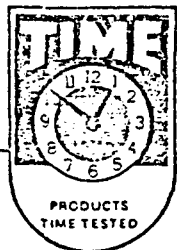
Campbell expressed Koppers desire to do two things:

- a. Pay us half the costs to date as requested.
- b. Come to some agreement where Time Oil will accept all liability for site contamination and relieve Koppers completely. Koppers is willing to pay money for this status.

I plan to discuss b above with our attorneys as soon as possible. Will advise results for consideration.

JPD/ch

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
LOS ANGELES



# TIME OIL COMPANY

2737 WEST COMMODORE WAY  
P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233  
SEATTLE, WASHINGTON 98124-0447

OCT 07 1987

RECEIVED

October 2, 1987

OCT 5 1987

Keystone Environmental Resources Inc.  
Jim Campbell  
436 7th Ave.  
Pittsburg, PA 15219

Environmental Resources

Dear Mr. Campbell:

This is in reference to our discussion regarding clean up costs at 12005 North Burgard in Portland, Oregon.

Enclosed are copies of the documents you wish to review.

- A. The Original invoice #091868 dated March 6, 1986 for \$42,081.21.
- B. A complete list of expenditures as of April 1, 1987.
- C. Billing for the additional charges of \$12,699.07 for expenses after the date of the original invoice.

Your cost for half the expenditure, per mutual agreement is \$54,780.28.

We appreciate your working with us and look forward to hearing from you at your earliest convenience.

Yours Truly,

TIME OIL CO.

*John E. Luckovich*  
John E. Luckovich  
Credit Manager

JEL:1td

Enclosures

00028

BZTO104(e)012105

TIME OIL CO.  
P.O. BOX 24447 TERM. STATION - SEATTLE WA 98124-0447  
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233  
PHONE (206) 285-2400

INVOICE 091868

DATE 03/06/86  
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY INC  
ATTN: DONALD F. MARION  
KOPPERS BUILDING ROOM 750  
PITTSBURGH PA 15219

657	60	123	27831.21
120	9		14250.00

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PORTLAND, OREGON.

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8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	<u>55,662.43</u>

COMMITMENTS

DEQ PER OAK 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (AMENDMENT 2)	25,000.00+
	<u>84,162.43</u>

50% = 42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL \$42,081.21

Encl. 1

ACCOUNTS RECEIVABLE

BZTO104(e)012106

TIME OIL CO. EXPENDITURES IN REFERENCE TO PENTACHLOROPHENOL CLEAN UP COSTS AT  
12005 NORTH BURGARD, PORTLAND, OR.

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	\$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	\$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	\$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	\$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	\$ 18,741.55
03/24/86	Environmental Emergency Services (Sandblast and demolish wall; install wells)	\$ 17,252.67
05/16/86	Instrumentation Northwest (Monitoring well materials)	\$ 3,702.66
06/11/86	Century West Engineering (Develop and sample wells)	\$ 2,739.50
06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	\$ 3,500.00
07/08/86	Century Environmental Sciences (sampling wells)	\$ 1,800.00
08/03/86	Ridgel Environmental Services, Inc. (Sampling and analysis)	\$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	\$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	\$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	\$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	\$ 130.50
		<u>\$109,560.57</u>

Koppers Company share of costs = 50% = \$ 54,780.28

TOTAL DUE FROM KOPPERS = \$ 54,780.28

Encl. 2

TIME FIL CO.

P.O. BOX 24447 TERM. STATION - SEATTLE WA 98124-0447  
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233  
PHONE (206) 235-2400

DEBIT MEMO 020190

DATE 04/17/87  
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY

Koppers Building - Room 750

Pittsburgh, PA 15219

ATTN: JAY STEBBINS

120 9

12699.07

-----  
THIS IS AN ADDITION TO INVOICE # 091363 DATED  
MARCH 6, 1986 FOR \$ 42,081.21 TO CHARGE YOU FOR  
HALF OF EXPENDITURES, PER MUTUAL AGREEMENT, IN  
REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD  
PORTLAND, OREGON.

12,699.07

COPIES OF THE ORIGINAL INVOICE (#091363, 3/6/86, \$42081.21)  
AND THE UPDATED CHARGES FOR \$ 54730.23 ARE ATTACHED.

INVOICE TOTAL

\$12,699.07

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
LOS ANGELES



# TIME OIL COMPANY

2737 WEST COMMODORE WAY  
P.O. BOX 24447, TERMINAL STATION

SEATTLE, WASHINGTON 98199-1233  
SEATTLE, WASHINGTON 98124-0447

PHONE 285-2400  
CABLE ADDRESS: TIMOIL

April 20, 1987

Koppers Company Inc.  
Attn: Jay Sebbins  
Koppers Building, Room 750  
Pittsburgh, PA 15219

Dear Mr. Sebbins:

This refers to our previous telecon regarding clean-up of Koppers pentachlorophenol at 12005 North Burgard, Portland, OR and Time Oil invoice 091868 dated 03/06/86, which you agreed to look into and give me a call back regarding payment.

To my knowledge, there has been no call hence this letter as a reminder. Since invoice 091868 was forwarded, those items shown on invoice as "COMMITMENTS" became a reality and have been paid by Time Oil. In addition, other essentials have been accomplished and fees for those services have been also paid by Time. The net result is an increase to Koppers share of costs by \$12,699.07.

Enclosed is copy of original invoice, a listing of expenditures to date and an invoice for one-half the cost of those expenditures incurred since original invoice. This package reflects total costs as of 04/01/87.

Your processing of these invoices for prompt payment is truly appreciated.

Sincerely,

  
John P. Denham  
Environmental Manager

Encl. a/s

JPD/jam

BZTO104(e)012109



## TIME OIL CO.

INVOICE 091868

P.O. BOX 24447 TERM. STATION - SEATTLE WA 98124-0447  
- 2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233  
PHONE (206) 285-2400

DATE 03/06/86  
REF. 03-03028 JKJ

CUSTOMER #: 03/05505623

## ACCOUNT:

KOPPERS COMPANY INC  
ATTN: DONALD F. MARION  
KOPPERS BUILDING ROOM 750  
PITTSBURGH PA 15219

657	60	123	27831.21
120	9		14250.00

-----  
TO CHARGE YOU FOR 1/2 OF THE FOLLOWING PER MUTUAL AGREEMENT  
IN REFERENCE TO CLEAN UP COSTS AT 12005 N. BURGARD RD.,  
PORTLAND, OREGON.

## EXPENDITURES

4/26/85 CHEM-SECURITY SYSTEMS (LABORATORY ANALYSIS OF SOIL SAMPLES)	150.00
7/10/85 NORTHWEST VACUUM TRUCK SERVICE (RELOCATING 242.76 TONS OF SOIL TO ARLINGTON)	9,000.00
7/29/85 CHEM-SECURITY SYSTEMS (RECEIVING 243.30 TONS OF SOIL AT ARLINGTON)	27,270.88
8/8/85 ENVIRONMENTAL EMERGENCY SERVICES (OBTAIN AND ANALYZE 3 COMPOSITE SAMPLES)	
12/31/85 ENVIRONMENTAL EMERGENCY SERVICES (PRIMARY SAMPLING AND ANALYSIS PLUS REPORT)	18,741.55
	-----
	55,662.43

## COMMITMENTS

DEQ PER OAR 240-102-065	3,500.00
*RIEDEL ENVIRONMENTAL SERVICES (ADMENDMENT 2)	25,000.00+
	-----
	84,162.43

50% = 42,081.21

\*NAME CHANGE FROM ENVIRONMENTAL EMERGENCY SERVICES

INVOICE TOTAL \$42,081.21

Encl. 1

ACCOUNTS RECEIVABL

BZTO104(e)012110

As of 04/01/87

TIME OIL CO. EXPENDITURES IN REFERENCE TO PENTACHLOROPHENOL CLEAN UP COSTS AT  
12005 NORTH BURGARD, PORTLAND, OR.

04/26/85	Chem-Security Systems (Laboratory analysis of soil sample)	\$ 150.00
07/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	\$ 9,000.00
07/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	\$ 27,270.88
08/08/85	Environmental Emergency Services (Sampling and analysis)	\$ 500.00
12/05/85	Environmental Emergency Services (Well drilling, sampling & analysis)	\$ 18,741.55
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06/11/86	Department of Environmental Quality (Per OAR 240-102-065)	\$ 3,500.00
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08/08/86	Riedel Environmental Services, Inc. (Sampling and analysis)	\$ 4,452.81
08/25/86	Jack Eatch Construction Co. (Relocate soil and dispose of concrete wall)	\$ 1,465.00
09/10/86	Concrete Coring Co. (Cut holes through concrete floor of warehouse)	\$ 390.00
10/24/86	SRH Associates, Inc. Investigation of pentachlorophenol as per contract dated 08/14/86	\$ 18,465.00
01/26/87	Century West Engineering (Well sampling and analysis)	\$ 130.50
		<u>\$109,560.57</u>

Koppers Company share of costs = 50% = \$ 54,780.28

TOTAL DUE FROM KOPPERS = \$ 54,780.28

Encl. 2

BZTO104(e)012111

TIME OIL CO.  
P.O. BOX 24447 TERM. STATION - SEATTLE WA 98124-0447  
2737 WEST COMMODORE WAY - SEATTLE WA 98199-1233  
PHONE (206) 285-2400

DEBIT MEMO #020190

DATE 04/17/87  
REF. 04-03131 FER

CUSTOMER #: 03/05505623

ACCOUNT:

KOPPERS COMPANY

Koppers Building - Room 750

Pittsburgh, PA 15219

ATTN: JAY STEBBINS

120 9

12699.07

-----  
THIS IS AN ADDITION TO INVOICE # 091863 DATED  
MARCH 6, 1986 FOR \$ 42,081.21 TO CHARGE YOU FOR  
HALF OF EXPENDITURES, PER MUTUAL AGREEMENT, IN  
REFERENCE TO CLEAN UP COSTS AT 12005 NORTH BURGARD  
PORTLAND, OREGON.

12,699.07

COPIES OF THE ORIGINAL INVOICE (#091368, 3/6/86, \$42081.21)  
AND THE UPDATED CHARGES FOR \$ 54780.23 ARE ATTACHED.

INVOICE TOTAL

\$12,699.07

ORIGINAL

BZTO104(e)012112

## 137

4

I offer the following historical summary on the above subject based on information in my file.

- On March 1, 1967 Time Oil Company and Monsanto (Wood Treating Chemicals, Inc.) entered into a blending contract with Time Oil, Wood Treating Chemicals supplied pentachlorophenol, mineral spirits, wax, etc. for the formulation of various pentachlorophenol-containing preservatives.
- In 1971 Koppers acquired the assets of Wood Treating Chemicals, Inc., from Monsanto. The blending agreement with Time Oil which was amended in 1970, continued.
- In January, 1981 Time Oil advised Koppers that they wished to terminate the Agreement. We continued to operate on a month to month basis, however, until the end of 1983.
- In December, 1983 the site was visited by Koppers Environmental Staff and a report issued.
- In 1984 Koppers removed all remaining product and raw materials from the site per our Agreement. Koppers also removed the sludge from the tanks at a cost of \$17,500.00. All tanks were cleaned and disposed of.
- Legal Department advised (December 5, 1984) that Koppers should assist Time Oil in determining what needs to be done and see that these actions are performed as thoroughly and promptly as possible in order to present further environmental degradation.
- Oregon Department of Environmental Quality (DEQ) visited the site on December 12, 1984 and took twelve soil samples.
- A delegation from Koppers (Baldwin, Marion, Garrity, Sturm, Templeton Smith) met with representatives of Time Oil (Abbendroth - CEO, Denham - Safety and Environmental Manager, Wallis - Plant Manager) on January 11, 1985 to discuss the situation. Abbendroth raised the question about sharing cleanup costs, but it was suggested that such a discussion was premature without preliminary cost estimates. Time Oil agreed to obtain same.

## Page 2

**TO:** Tom Hays **FROM:** W. J. Baldwin  
**SUBJECT:** Time Oil Company **DATE:** February 23, 1987

- Received status update dated June 11, 1985 from Time Oil which included disposal cost estimates of \$72,000. It was suggested by Time Oil that we split the costs 50/50.
- Nine truckloads of soil manifested off-site at a cost of \$60,000 by Time Oil (Koppers did not respond to suggested 50/50 split.) Sampling performed after cleanup by Riedel Environmental Services, report dated October, 1985, which indicated that there was additional penta-contaminated soil on the site.
- Denham and Abbendroth met with Koppers (T. Smith, D. Kerschner, J. Garrity, D. Marion, W. Baldwin) in Pittsburgh on January 23, 1986 to discuss cleanup. John Denham advised that EPA and DEQ reclassified the waste as F027 and, as such, no landfill could accept. Denham advised that they were investigating alternative approaches such as biodegradation and encapsulation.
- Denham sent Baldwin a copy of a report on alternative cleanup technologies by ATW-Calweld on January 27, 1986. The report was reviewed by Corporate Environmental who felt it contained insufficient information and was of little value.
- March 13, 1986 - Koppers received an invoice in the amount of \$42,081 from Time Oil for one-half of the site cleanup costs. This included \$12,500 (Koppers share) of additional work to be provided by Riedel Environmental Services. (Note: It does not appear that this invoice has been paid).
- A work plan for the Riedel work was received from Time Oil on August 8, 1986.
- January 14, 1987 - Koppers received a site update prepared by SRH Associates, Inc. dated October 1, 1986 as well as a proposal and cost estimate by SRH for performance of bench scale evaluations of a "soil washing" technique at a cost of \$42,030 (total).

## Page 3

**TO:** Tom Hays **FROM:** W. J. Baldwin  
**SUBJECT:** Time Oil Company **DATE:** February 23, 1987

- The January 14, 1987 submission by Time Oil was briefly reviewed by Keystone Environmental Resources on February 6, and several problems were noted. Later, Keystone reported that they may have technology that would be more suitable for remedial cleanups and would be willing to do some bench-scale testing.

William J. Baldwin

WJB/bml

BZTO104(e)012115

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

February 19, 1986

Koppers Company, Inc.  
Attn: Donald F. Marion  
Forest Products Group  
Koppers Building, Room 750  
Pittsburgh, PA 15219

Dear Don:

This refers to our mutual problem of pentachlorophenol contamination at 12005 North Burgard Road in Portland Oregon.

During our January 23, 1986 meeting at your offices in Pittsburgh, you mentioned that Koppers would agree to paying half the clean-up costs incurred/committed to date and that further coordination between Koppers and Time would be appropriate for future commitments. Time concurs with this approach.

In this light, the below accounting to date will be followed by an invoice two weeks from today unless we hear some objections from you before then.

### EXPENDITURES

4/26/85	Chem-Security Systems (Laboratory Analysis of soil sample)	150.00
7/10/85	Northwest Vacuum Truck Service (Relocating 242.76 tons of soil to Arlington)	9,000.00
7/29/85	Chem-Security Systems (Receiving 243.30 tons of soil at Arlington)	27,270.88
8/8/85	Environmental Emergency Services (Obtain and analyze 3 composite samples)	500.00
12/5/85	Environmental Emergency Services (Primary sampling and analysis plus report)	<u>18,741.55</u> \$55,662.43

61

BEP116793

BZTO104(e)012116

COMMITMENTS

DEQ per OAR 240-102-065

3,500.00

\* Riedel Environmental Services (Amendment 2)

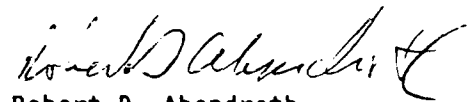
25,000.00 +  
\$84,162.43

50% = \$42,081.21

\* Name change from Environmental Emergency Services

Should you have any questions regarding the above, please give me a call.

Sincerely,



Robert D. Abendroth  
Operations Manager

RDA/ch



SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

February 19, 1986

Koppers Company, Inc.  
Attn: Donald F. Marion  
Forest Products Group  
Koppers Building, Room 750  
Pittsburgh, PA 15219

Dear Don:

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8/8/85	Environmental Emergency Services (Obtain and analyze 3 composite samples)	500.00
12/5/85	Environmental Emergency Services (Primary sampling and analysis plus report)	<u>18,741.55</u>
		\$55,662.43

61

BEP116793

BZTO104(e)012118

COMMITTMENTS

DEQ per OAR 240-102-065

3,500.00

\* Riedel Environmental Services (Amendment 2)

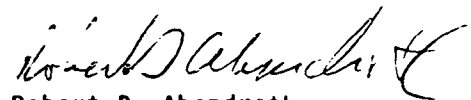
25,000.00 +  
\$84,162.43

50% = \$42,081.21

\* Name change from Environmental Emergency Services

Should you have any questions regarding the above, please give me a call.

Sincerely,



Robert D. Abendroth  
Operations Manager

RDA/ch

61

4.

BEP116794

BZTO104(e)012119

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



## TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

February 4, 1985

Department of Environmental Quality  
Attn: Janet Gillaspie, Northwest Region Manager  
522 S.W. 5th Avenue, P.O. Box 1760  
Portland, Oregon 97207

Dear Ms. Gillaspie:

This pertains to our Northwest Terminal location at 12005 North Burgard in Portland, Oregon and the bulk pentachlorophenol operation at that site. The purpose of this letter is to acquaint you with concurrent actions being taken by two companies to voluntarily correct what both felt may become a problem.

### BACKGROUND

In March of 1982, a potential problem with the ground surrounding the pentachlorophenol operation was determined. Contract between Koppers Co. (product owner) and Time Oil Co. (land owner) was cancelled. Product phaseout and clean-up actions were jointly agreed upon by both companies. Accomplishments to date have been:

- a. Bulk pentachlorophenol operations ceased.
- b. On hand product inventory blended off and shipped out.
- c. All tanks and piping cleaned.
- d. Waste from cleaning shipped to Arlington.
- e. Piping removed and scrapped.
- f. Time Oil Co. tanks removed and scrapped.

Remaining to be accomplished are:

- a. Removal of Koppers owned tanks (scheduled for week of February 4, 1985).
- b. Contaminated soil removal and replacement.

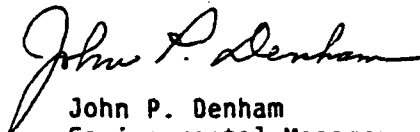
On December 12, 1984, Messrs. John Smits and Rick Gates of your office conducted soil sampling activities at the site. Twelve samples were taken inside diked areas. Split samples were provided Time Oil Co. DEQ laboratory test results (49 pages) were received here on February 1, 1985. Telecon with Messrs. Smits and Gates on that date revealed the following:

- a. All samples were tested for lead content. None were found to be above normal limits (page 1).
- b. All samples were tested for fourteen different pesticides. None were found to be above normal limits (pages 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36).
- c. All samples were scanned for organic chemicals other than priority pollutants (pages 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, 37). No unknowns were identified above detection limits on nine of these samples. On three sample, (pages 13, 28, 31), the compounds tentatively identified were those petroleum residues normally expected to be found in a tank farm. Estimated concentrations were so low that none were at all significant, simply present.
- d. All samples were tested for priority pollutant chemicals (pages 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35). No unknowns were identified above detection limits on eight of these samples. On one sample (page 11), only two trace elements were found. Both were in the 1 ppm quantity, which is not considered significant and certainly cannot be classed as a problem. On one sample (page 23), three residues of polynuclear aeromatics were found, again insignificant in quantity. On one sample (page 26), one more polynuclear aeromatic of insignificant quantity was found along with a small quantity (515 ppm) of pentachlorophenol and 12 ppm of tetrachlorophenol. It is my understanding that since this quantity (515 ppm) of pentachlorophenol is below 1000 ppm, it falls in the gray area of consideration regarding significance. The tetrachlorophenol is a part of commercial pentachlorophenol so its presense would naturally be expected. On one sample (page 29), pentachlorophenol (1820 ppm) and tetrachlorophenol (71 ppm) were found. This latter finding confirms our unitedly expressed (Koppers and Time Oil) concern and substantiates the need for corrective action as we had previously planned.

CURRENT

As of today, it appears that our (Koppers and Time Oil) initial plan of action remains valid. Progress has been made. Time and more favorable weather conditions should result in the contaminated soil being removed, necessary second soil tests being conducted and new soil being put in place without difficulty.

Sincerely,

  
John P. Denham  
Environmental Manager

JPD/ch

PHONE 285-2400  
CABLE ADDRESS: TIMOIL

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

*Time Oil Field -  
Portland Ore.*

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 16, 1985

Templeton Smith  
Law Department  
Koppers Co. Inc.  
Pittsburg, PA 15129

Dear Mr. Smith:

Per your request, attached is copy of plot plan 1140 showing location at our Northwest terminal where the Department of Environmental Quality sampled the ground within the diked area in which Pentachlorophenol operations were conducted. Sample was a composite of surface, one foot and two foot depths.

It was a pleasure to meet you in St. Louis last week.

Sincerely,

*John P. Denham*  
John P. Denham  
Environmental Manager

Attachment a/s

JPD/ch

BZTO104(e)012122

# M E M O R A N D U M

January 15, 1985

TO: File  
Robert Abendroth (info) Seattle  
Neil Wallis (info) Portland

FROM: ✓ John Denham Seattle

SUBJECT: WOODTREATING AT NORTHWEST TERMINAL

On October 3, 1983, Neil Gallagher, Neil Wallis and I (TOC) met with John Palmer and Bill Baldwin (Koppers) at Northwest terminal to establish phaseout actions necessitated by the March 31, 1982 contract termination between the two companies. A verbal agreement was reached.

On January 11, 1985, Robert Abendroth, Neil Wallis and I (TOC) met with Koppers Co. personnel in St. Louis, Missouri. Present from Koppers were Templeton Smith (Counsel); Don Marion, Jim Garrity and Jeff Stern (Operations) and Bill Baldwin (Environmental). Purpose of meeting was to provide an update on actions taken thus far and to resolve any differences regarding closure of work site at Northwest terminal.

## Accomplishments to date have been:

## Action Co.

- |   |         |
|---|---------|
| a. Bulk Pentochlorophenol operations ceased.      | Both    |
| b. On-hand inventory blended off and shipped out. | Both    |
| c. All tanks and piping cleaned.                  | Koppers |
| d. Waste from cleaning shipped to Arlington.      | Koppers |
| e. Piping removed and scrapped.                   | TOC     |
| f. TOC tanks removed and scrapped.                | TOC     |
| g. Warehouse steam cleaned.                       | TOC     |

## Remaining to be accomplished are:

## Action Co.

- |   |         |
|---|---------|
| a. Removal of Koppers owned tanks.            | Koppers |
| b. Contaminated soil removal and replacement. | Both    |
| c. Cost sharing of contaminated soil problem. | Both    |

It is my understanding that Northwest Vacuum Truck Service will remove Koppers owned tanks immediately on receipt of tank release from Koppers.

Soil removal efforts, as planned on October 3, 1983, have been temporarily thwarted due to Department of Environmental Quality (DEQ) December 12, 1984 intrusion on another matter. The DEQ took one soil sample within the diked area where Koppers operation took place. We must now await receipt of DEQ laboratory reports on this sample to determine extent of soil removal needed. Soil removal plan remains the same - remove and dispose of discolored soil (about one foot deep), sample ground below that point and either continue removal until no further contaminated soil is found or stop when that point is reached and refill area with clean soil. While we are waiting for DEQ laboratory reports, Neil Wallis will obtain estimated soil removal and disposal costs from Northwest Vacuum Truck Service, Chem-Security and Environmental Emergency Services on a cubic yard basis.

Once extent of soil removal and its related costs become known, it is my understanding that Robert A. will coordinate with Koppers and settle the cost sharing matter. Job can then be completed.

JPD/ch

**WESCOMP inc.**

Western Compliance Services, Inc.

"The Waste Management People"

INVOICE # 10442

SOLD TO: Koppers Inc.  
701 Koppers Bldg.  
Pittsburgh, PA 15219

MANIFEST # 2766NWVT  
DATE: 11-30-84  
YOUR ORDER # 10-4-3032  
SHIPPED TO: Arlington

OUR ORDER #	CONTACT	TERMS
TK	Terry Kraft	2%/10 NET 15 DAYS

DESCRIPTION	UNIT PRICE	unit	AMOUNT
Hazardous Waste Services: Permitting, labeling, loading, manifesting, inspecting, transportation and disposal.	\$6.40	2500	\$16,000.00
	\$1.50	1000	\$ 1,500.00

**61**

Please Pay This Amount \$17,500.00

Please Remit Payment to: Western Compliance Services, Inc.  
P.O. Box 338  
Tualatin, Oregon 97062

P.O. Box 338, Tualatin, Oregon 97062 (503) 684-3066

BZTO104(e)012125



TO: J. GARRITY  
ST. LOUIS, MO  
DONALD F. MARION

12/11/84

Jim,  
Attached for your processing is  
Wesco, Inc.'s invoice for  
hazardous waste services at  
Pine D.C. Please call me  
regarding this invoice.  
Let's make sure it's  
paid in December prior  
to the end of fiscal  
1984. I don't want it to  
affect 1985.

Thanks  
Don  
N

M E M O R A N D U M

December 13, 1984

TO: Robert Abendroth (less encl) Seattle  
Terry Henderson (less encl) Seattle  
Neil Wallis Portland

FROM: John Denham Seattle

SUBJECT: DEQ INSPECTION AT NORTHWEST TERMINAL

This is a follow-up to my July 5, 1984 memo on above subject and DEQ inspection (part on October 25 and part on December 12).

BACKGROUND

DEQ is participating in EPA's HW 3012 Superfund Inspection Program during 1984 to determine hazardous wastes at 44 abandoned, uncontrolled hazardous wastes facilities in Oregon. Our Northwest terminal has been designated as such a facility even though neither TOC nor any of the other companies listed meet any of these three categories. DRS 459.670 authorizes such inspections and all that follows. The time frame of DEQ interest is from date of facility ownership (1953) until 1972.

On October 25, DEQ inspected the site, heard how we did what, viewed our procedures and decided it would sample the ground within all diked areas. On December 12, DEQ took 12 samples at locations shown on attached plot plan. We obtained split samples and are maintaining them at 40°F. in the Northwest terminal refrigerator. DEQ estimates sample analysis to be completed by January 15, 1985 and will advise us of results in writing. We in turn would then consider having only unfavorable results analyzed by a laboratory of our own selection and take it from there.

Attachments a/s

JPD/ch

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

November 20, 1984

Department of Environmental Quality  
Northwest Region  
Attn: John L. Smits, R.S.  
522 S.W. Fifth Avenue, P.O. Box 1760  
Portland, Oregon 97207

Dear Mr. Smits:

This is to acknowledge receipt of your November 14, 1984 letter regarding DEQ HW-3012 assessment of Time Oil Co. facility at 12005 N. Burgard in Portland, Oregon.

As per our telecon today, date of sampling was confirmed to be December 12, 1984. One additional bit of information is needed at the time sampling is done - the name of the tests to be performed on soil samples taken.

Sincerely,

A handwritten signature in cursive script, reading "John P. Denham".

John P. Denham  
Environmental Manager

JPD/ch



## Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE: (503) 229-5696

November 14, 1984

Time Oil Company  
P.O. Box 24447  
Terminal Annex  
Seattle, WA 98124

Re: HW-3012 Superfund  
Time Oil Company  
Multnomah County

The Department is conducting an assessment of past waste disposal practices at your facility at 12005 N. Burgard, Portland, Oregon as part of a RCRA Section 3012 cooperative agreement with EPA. The assessment included a site inspection and interview with John Denham and Neil Wallis on October 25, 1984.

In order to properly complete the assessment, a grid of composite soil samples tested for priority pollutants is required from within the tank farm. This includes the old Bell Oil Terminal and additional samples near the tanks leased to Crosby and Overton. Proposed sampling points are shown on the attached map.

The purpose of this activity is to determine if there are environmental problems associated with past handling of tank bottoms, draw waste waters, separator sludge, pentachlorophenol and wastes handled by Crosby and Overton. The Department cites Oregon Revised Statutes (ORS) 459.670 (copy enclosed) governing hazardous waste as authority to enter the site for sample collection.

The Department requests your cooperation in completing the assessment work. We have a limited amount of time to complete this activity and, therefore, as agreed we propose to collect samples on December 18, 1984 beginning at 1:30 p.m. Sampling will take two to three hours. Split samples will be provided in containers to you. If you wish to hold samples for later analysis, the temperature should be maintained at 4° C. We expect to be able to phone preliminary results about 30 days after collection. Test procedures will be provided to you at the time of sampling.

If you have any questions, please feel free to contact me at our Portland office at (503) 229-5296 or (503) 738-5949.

Sincerely,

John L. Smits  
Environmental Analyst  
Northwest Region

JLS:b  
RB3953  
Enclosure(s)

cc: Northwest Region, DEQ  
Hazardous Waste Operations, DEQ  
Crosby and Overton  
EPA Region I  
Superfund Program Management Section  
DEQ - Laboratory

CC: B. BALDWIN ✓  
B. HAMILTON

# KOPPERS

## Interoffice Correspondence

To Don Marion  
Location K-700  
Subject Time Oil

From James F. Garrity *Over St. Louis Planting*  
Location St. Louis  
Date October 17, 1984

Met with Neil Wallis, John Denham, Fred Proby, and Neil Gallagher to discuss a clean-up procedure at Time Oil.

The clean-up will be broken down into three phases: Phase one, internally clear thirteen tanks and remove as bulk waste; Phase two, remove Koppers own storage tanks to an area to be scrapped; Phase three, determine soil contamination.

### Phase One:

Western Compliance Service, Inc. (Wescomp) is taking care of arranging the tank clean-out. One tank will act as a holding tank for the waste and rinse liquids. From this tank a homogeneous sample will be taken and submitted to Coffey Labs. Once results are known, either the existing profile sheet can be used or a new profile sheet must be submitted to the Department of Environmental Quality for approval. Once approved Chemical Security will solidify and arrange to move the hazardous waste to the waste landfill in Arlington, OR. (Estimated completion time, eight weeks.)

### Phase Two:

George McGinley, Pittsburgh Purchasing, is receiving bids on removing the six horizontals and one mobile tank that Koppers own. These seven tanks will be scrapped (away from danger) on Time Oil's property.

### Phase Three:

The diked area where the storage tanks rest need ground samples taken. The floor in this area of concern consists of sand and dirt. Over the years an unknown amount of Woodtox Preprime and 140 has leaked into the soil. The clean-up responsibilities are Time Oil's, but they would like Koppers to contribute. I'll be in contact with Bill Baldwin to update him so he can get involved.

This is a general description of what will take place over the next few months. If a more detailed report is needed, please advise.

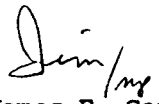
### WTC Inventory (10/2/84)

1. Mineral Spirits	300 gals.
2. Paraffin Wax	1111 gals.
3. Phosphoric Acid	125 lbs.
4. WR-340 Conc.	165 gal.
5. 55 gal., TH, B&W, Drum	50 ea.

61

MEMO TO DON MARION  
PAGE 2  
OCTOBER 17, 1984

1. The mineral spirits will be used to rinse the storage tanks after they have been pumped dry.
2. The paraffin wax is being sent back to St. Louis to be used there.
3. The phosphoric acid will be returned to Van Walter and Rogers.
4. Three drums of WR-340 are being offered at distressed price to Cal Wood Door.
5. Sold Time Oil the 50 empty drums.

  
James F. Garrity

JFG/mp

# M E M O R A N D U M

**July 5, 1984**

TO: Robert Abendroth Seattle  
Terry Henderson Seattle  
Neil Wallis Portland

FROM: ✓ John Denham Seattle

SUBJECT: DEQ PROPOSED INSPECTION OF NORTHWEST TERMINAL

On April 27, 1984, the DEQ advised our Portland office by letter, that the Northwest terminal was on a list of 44 companies, which are scheduled to be inspected during 1984. Inspection was allegedly pertinent to "uncontrolled abandoned" hazardous waste disposal sites in Oregon". Letter was finally received by me on May 15th.

Since TOC does not operate a hazardous waste disposal site, I attempted to find out from both the DEQ and the EPA, just why we were on the list at all. As it turned out, the EPA provided DEQ with Superfund money for coming up with a list of sites to be inspected, the inspection of those sites and the rendering of a report of inspection. It is of interest to note that none of the 44 companies scheduled for inspection are TSD's. All this information was noted in my May 25th request to the DEQ that TOC be removed from the list.

Today my May 25th request was denied, copy attached. Contact with Terry on this matter resulted in a legal opinion that we can do nothing to prevent the inspection. Contact with the DEQ (John Smits 503 325-8660) revealed inspection is scheduled for late August. I will be there.

**JPD/ch**

**Attachment a/s**



## Department of Environmental Quality

522 S.W. FIFTH AVENUE, BOX 1760, PORTLAND, OREGON 97207 PHONE: (503) 229-5696

April 27, 1984

- Time Oil Company  
12005 N. Burgard Street  
Portland, OR 97203

*Inspection  
Program mgr.  
Greg Barclay  
229-5296*

Dear Plant Manager:

Your company has been listed as one of 44 which our staff will be inspecting this year to gather better information about your past waste disposal practices. This effort is part of a year-long study funded by the federal Environmental Protection Agency (EPA).

The inclusion of your company on this list does not indicate that we believe any environmental problem exists on your property. Generally, there have been hazardous waste management problems nationwide at other types of businesses similar to yours and consequently we would like to gather additional data. The list of 44 sites was developed by EPA using a variety of information sources including industrial categories, information voluntarily gained under the Superfund reporting system, and others.

I have enclosed a report which went to our Commission earlier this month which discusses our abandoned site investigation work in greater detail. Should you need additional information about the specific reason your company was included on the list, please contact Debbie Flood in EPA's *37 Ees* Seattle Regional Office at 206/442-2722. Should you want more information about our hazardous waste management program here in Oregon, please contact Rich Reiter in Portland at 229-6434. Our toll-free telephone number is 1-800-452-4011.

*Developed  
list  
1/1/84*

*John Meyer  
442-7215*

Sincerely,

*Fred Hansen*

Fred Hansen  
Director

FH:d  
FD761 (44)



# KOPPERS

## Interoffice Correspondence

CC: J. D. Hite  
ROUTE PGH: JFB, WHS, MAS, DBM,  
WJB, MAC, KEC, SS  
Conley: F. Boge/F. Klasnick  
Orrville: C. McIntyre/H. Fry  
St. Louis: J. Palmer/C. Kempinska

To Joe Kusar  
Location K-750  
Subject MAY MONTHLY REPORT

From D. W. May  
Location K-750  
Date June 4, 1984

### SALES HIGHLIGHTS - May, 1984

#### WOOD TREATING CHEMICALS

	<u>May '84</u> <u>(\$000)</u>	<u>YTD '84</u> <u>(\$000)</u>	<u>May '83</u> <u>(\$000)</u>	<u>YTD '83</u> <u>(\$000)</u>	<u>Performance</u> <u>YTD</u>
NON-TRADEMARK CCA					
Distributor	0	0	249	1278	0
Others	275	988	201	842	17
TOTAL NON-TRADEMARK	275	988	450	2120	(53)
PENTA					
Customers	10	58	22	44	32
Koppers Plants	152	518	115	657	(21)
TOTAL PENTA	162	576	137	701	(18)
ARSENIC ACID					
Filtered Tech	80	227	104	165	37
High Purity	23	274	137	303	(10)
TOTAL ARSENIC ACID	103	501	241	468	7
FORMULATED PRODUCTS					
Millwork Solutions	79	345	67	347	0
Sawn Lumber					
Chemicals**	96	413	89	353	(17)
Remedial Pole					
Treatments	45	70	37	112	(37)
MISCELLANEOUS	<u>101</u>	<u>613</u>	<u>306</u>	<u>1003</u>	<u>(39)</u>
TOTAL FORMULATED PRODUCTS	321	1441	499	1815	(20)

\*\*Sawn lumber chemicals (\$) includes all Sapstain and end sealer/lumber castings.

Joe Kusar  
May Monthly Report  
June 4, 1984  
Page 4

#### TIME OIL

We have recommended that we discontinue production of Woodtox at this location due to the lack of justification for a \$90M capital expenditure based on future sales potential of 80,000-100,000 gallons/year. A full report will be issued.

#### ARSENIC ACID

##### Hoover

This customer has not as yet signed our proposed contract for purchase of Arsenic Acid. It is still under review by the customer and hopefully a decision will be made prior to the next report period.

##### GTE (Versailles, KY)

This account has decided to stop using Arsenic Acid due to EPA requirements on stack emissions. We have arranged for Bill Baldwin to discuss this subject with the account directly in the event that a change in decision is possible.

##### Langdale

Sales of Arsenic Acid have been exceptionally good here being almost twice the volume required by the contract. We will continue to call on this account as a prime account and develop a forecast as to their requirement from Koppers for the rest of this year.

##### PB&S

We have contacted this account to urge increased effort to distribute Koppers Arsenic Acid. We have learned that pricing has reduced possibility of increased sales in that the market price in the areas involved is approximately \$0.52/lb. delivered in drums. Koppers price to this account is \$0.48/lb. in drums F.O.B. plant. PB&S is mostly interested in large volume business rather than promoting the Arsenic Acid to small accounts. They will, however, work up a program as to what they feel they can sell at the prices we have discussed and we can then make a decision whether to continue with them as a distributor or perhaps find a more aggressive distributor to replace them.

# KOPPERS

## Interoffice Correspondence

To C. P. Brush

From Wm. J. Baldwin

Location K-1201

Location K-750

Subject Time Oil - Portland, OR

Date January 20, 1984

I have several comments with regard to your December 12, 1983 correspondence, same subject. Firstly, it should be noted that Monsanto utilized Time Oil Company as a toll producer during the period 1967 through 1971. Koppers purchased the Wood Treating Chemicals Department from Monsanto in December of 1971 and continued to utilize Time Oil as a toll producer.

John Palmer and myself did have discussions with Mr. John Denham concerning clean-up of the area. We did commit ourselves to removing existing stock from the tanks as well as tank cleanout and removal from the site. When Mr. Denham brought up the subject of soil sampling, I mentioned that we have utilized the ASTM extraction method for determining the extent of soil contamination, i.e., see the closure plan for Richmond, VA plant. We did not commit ourselves to any degree of soil clean-up but noted that we would work with Time Oil in this regard. We also noted that our attorneys have reviewed the original agreement and have determined that Koppers Company has limited liability. We also discussed the fishbio-assay testing and I'm attaching a copy of the report for your review.

Please note that the "U.S. EPA Annual Products Reports" for Time Oil have been filed by our St. Louis office. By copy of this letter to John Palmer I request that Pittsburgh be copied on all such reporting in the future.

As noted above our plans for clean-up include sale of existing inventory, tank cleanout and removal. John Palmer will be contacting Chuck Vita with regard to locating a suitable tank clean-out company in the Portland area and a method of disposing of the cleaned tanks. I believe we all agree that some soil clean-up in the area will have to be performed; however, as noted previously the extent of our involvement has not been determined. As such, I request that you prepare a plan for site clean-up

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_ From \_\_\_\_\_  
Location \_\_\_\_\_ Location \_\_\_\_\_  
Subject \_\_\_\_\_ Date \_\_\_\_\_

--- 2 ---

which could be used in our negotiations with Time Oil. At this time, it has not been determined whether or not we will continue to utilize this location as a toll producer; however, if both parties agree to do so, I will also be asking you to coordinate the legal review of a modified blending agreement.

*Bill*

W. J. Baldwin

WJB:jr

Attachment

cc: John Hite - w/Attach.  
John Palmer  
T. F. McGuire  
Steve Tomko  
A. C. Middleton  
M. S. Marino  
T. A. Marr  
Chuck Vita

1/24/84 - C.V.B. will contact  
G Mills + get ball rolling  
on an agreement from

1/31/84 - CB looking @  
2/14/84 - will be for  
WKs - down up  
usual / analysis remaind.  
? level

CC: J. PALMER  
B. BALDWIN

# KOPPERS

Interoffice Correspondence

SEP 29 1983

SEP 29 1983

To Stephen T. Tomko  
Location Pittsburgh, PA  
Subject Operating Agreement and  
Lease of Tanks  
Portland, Oregon

From Real Estate Section  
Location Pittsburgh, PA  
Date September 29, 1983

Wood Treating Chemical Co., (now Koppers Company, Inc.,) and Time Oil Company entered into an Operating Agreement and Lease of Tanks dated March 1, 1967 for a five-year term to March 1, 1972. Our Document 1617-A-1 covering the transaction is enclosed.

The agreement was automatically renewed for a second five-year term to March 1, 1982. In accordance with Article 16 (a) on page 9 of the agreement, the landlord gave notice of termination by letter dated January 28, 1981 as required by the agreement.

We have continued to operate since March 1, 1982 on a verbal month-to-month basis and have attempted to negotiate a new agreement. We are seriously considering canceling the month-to-month arrangement and negotiating with others offering the same services but the question arises as to possible environmental responsibilities under the existing agreement. Would you please review and advise at your earliest convenience as there is some urgency in this matter. The Real Estate Section's project file is also attached for your review.

I direct your attention to Article 5 on page 4 of the agreement regarding liability and responsibility of the parties for "... pollution ...". Also, the May 5, 1972 letter from Time Oil Company to Koppers indicates that we own or owned five tanks which were part of the assets Koppers purchased from Wood Treating Chemical in 1971. Also, please note the comments by John F. Ramser in his letter dated June 27, 1972 regarding an agreement dated March 1, 1967 which seems to indicate we do own or owned five tanks on June 27, 1972.

Also, kindly note the proposed draft of Storage and Concentrate Dilution Agreement with my cover letter to you dated April 26, 1983.

T. F. McGuire

TFM/sjd  
Attachments  
cc: D. Marion

# KOPPERS

Donald F. Marion  
Manager, Raw Materials  
Specialty Wood Chemicals Division

June 14, 1983

Mr. Neil Wallis  
Time Oil Company  
12005 N. Burgard Street  
Portland, OR 97203

Dear Neil:

I would like to take this opportunity to thank you and Don Schwendiman for meeting me in Seattle at the airport on Thursday, June 9 to discuss the Storage and License Agreement. I feel that all of the non-economic verbage items have been resolved to our mutual satisfaction. I would hope that we can now agree on the minimum storage fee and the per gallon blending fee and have the agreement executed by both parties by June 30, 1983. I would like to get the first 10,000 gallon railcar in motion to you as quickly as possible. Please review your numbers and advise if you need to discuss any remaining items. I am truly looking forward to getting these negotiations behind us.

Again, my sincere thanks to both Don and yourself for meeting me in Seattle. I will be anxiously awaiting your call on the remaining open items.

Sincerely yours,

  
Donald F. Marion

DFM/dkm

cc: Robert D. Avendroth  
✓ Donald L. Schwendiman

JUN 2 1983

# KOPPERS

## Interoffice Correspondence

cc: J. D. Hite  
J. Kusar  
D. MacArthur  
D. F. Marion  
K. E. Cogan K/700

To Paul A. Goydan  
Location K/750  
Subject May Monthly Report

From John D. Palmer  
Location WTC - St. Louis  
Date June 2, 1983

### GENERAL COMMENTS

#### Time Oil

The contract is in the hands of Time Oil. George Mills has completed various tests on the concentrate and has also prepared a draft label for Bill Baldwin.

#### Jones-Hamilton - WTC

Four batches of Liquid Noxtane SS-1, three batches of T-1, and one small batch of Liquid Azide are being produced by Jones-Hamilton.

#### Jones-Hamilton - CCA-C

Production and inventory variances have been discussed with Dan Gilbert. We will be setting up new guidelines.

#### St. Louis

Production of all products were still at an increased level. We did find time to allow each man to take one week of vacation.

#### May Inventory:

Current \$ (000)	500
Percent of Change from Previous Month	(11%)
Month Prior Year	(10%)

St. Louis invoicing for WTC formulated products was at an all time high of \$520,000 for the month of May.

#### Raw Materials

A source of #2 fuel oil has been secured at a price below \$0.80/gallon delivered.

KB-3 continues to be in tight supply.

#### Miscellaneous

I will enter the hospital for surgery May 31. Everyone has been briefed on filling in for me. George, with Pittsburgh's assistance, will handle purchasing and production. Carol will handle penta and KB-3 purchasing and Newark payables. Harold will handle St. Louis payables. All production men will be working.

55

John D. Palmer

JDP:klc

# KOPPERS

cc: ~~J. Kusar~~  
D. MacArthur  
R. Stefanski  
E. Yeadon

MAR 2 1983

## Interoffice Correspondence

To John D. Hite From Paul A. Coydan  
Location K-1001 Location K-1001  
Subject February Monthly Report Date March 1, 1983

### CHEMICAL SALES HIGHLIGHTS (\$ 000's)

	Month 1983 <u>Actual</u>	1982 <u>Actual</u>	1983 <u>YTD</u>	1982 <u>YTD</u>	YTD % Relative <u>Performance</u>
<u>Formulated Products</u>					
Millwork Solutions	74	51	131	86	52
Sawn Lumber Chemicals	54	40	86	54	59
Log Home Solutions	49	--	49	0	
Remedial Pole Treatments	23	4	50	6	733
All WTC Formulated Products	270	140	535	264	101
<u>Pentachlorophenol</u>					
Outside	22	24	22	99	(77)
Koppers Plants	108	141	264	179	47
<u>Non-Trademark CCA</u>					
Direct	144	152	435	125	248
Distributor	300	27	418	57	633
	444	179	858	282	204
<u>Arsenic Products</u>					
Acid-Merchant	0	54	44	109	(60)
Acid-KHC	86	138	136	246	(45)
	86	192	180	355	(49)
<u>Chrome Products</u>					
Acid-Merchant	0	0	0	0	
Acid-KHC	144	181	214	309	(31)
Sodium Bichromate	34	0	62	0	--
<u>Copper Products</u>					
Copper Sulphate	0	0	0	0	



Although we ran three Saturdays of overtime in December and January, we are now operating without overtime in St. Louis. This will be the rule and the exception to run overtime will be an extraordinary one.

Jones-Hamilton and Time Oil

We have still not finalized our contract with Time Oil. John Palmer and I will be visiting Time Oil the week of March 7 to bring this negotiation to a conclusion.

We have had complaints on two recent CCA shipments that truck drivers did not handle their responsibilities properly. In one case the driver was accused of letting the hose drain on unprotected soil. We are looking into these allegations now. I have instructed Don Danka to work with John Palmer to see that Jones-Hamilton has a monthly safety review and driver training sessions. I have also asked Harold Struessel to begin putting together a feasibility study on justification of our own tank truck on the west coast and our own driver. If we do get into the arsenic acid business on the west coast with J. H. Baxter, this will greatly swing the pendulum toward justifying our own truck and driver.

John Palmer's and Glenn Schultz's monthly reports were not available at the time of this writing, however, they are attached.

KOPPERS HICKSON CANADA

General Business Activity

We blended 224,000 oxide pounds of CCA for KHC in February versus 196,000 ox. lbs. in February 1982. Our YTD performance is flat compared with 1982. Canadian retailers committed heavily to treated lumber in January and February to take advantage of the relatively depressed white lumber prices. However, in the past three weeks as lumber prices began to rapidly increase, buying activity on the part of the retailer, and consequently licensee treating volumes, declined. We do not expect any significant rebound for another month when the retailer will have to commit for the spring and summer markets.

We just learned that Revelstoke, who buys three to four loads of concentrate per year primarily for treating fence posts, has decided to go out for open tender. They have asked for extended terms and are apparently shopping for the lowest pricing. We have just learned that we will not be honored with this business despite of reducing our price to nearly \$1.20 FOB Valparaiso with 60 day terms. We are not sure whether Osmose or Great Western Chemical has obtained this business. We will attempt to learn more about this situation. This position on Revelstoke's part was apparently prompted by severe economic pressure within the corporation. It is being rumored that there are financial problems in the corporation.

We have recently had some general discussions with PDL Corporation, a large Osmose licensee in Toronto. PDL utilizes approximately 500,000 lbs. of CCA per year, 75% of which goes into utility poles. PDL did approach us. We are putting together a package deal to try to wrestle PDL away from the Osmose camp.

# KOPPERS

## Interoffice Correspondence

FEB 17 1983

To John D. Palmer

From Paul A. Goydan

Location WTC - St. Louis

Location SWCD - Pittsburgh

Subject Time Oil Company

Date 2/15/83

Regarding Time Oil's desire to clean out Tank 20001 and Tank 13001 that apparently have some settled sludge in them, I would like to advise that settled material in a tank that is being continuously used for operations is not considered hazardous waste. The only time something is considered hazardous waste is if the material is physically removed from an operating or working tank and put into separate containers purely for the purpose of holding or storing waste. If Neil Wallace of Time is concerned about having hazardous waste in a tank that is under operational or working control, he is in error and you should advise Neil.

The question I have is whether these tanks really need to be cleaned now or whether we can wait and continue to produce adequate and good product. Another question I have is whether we can try to redissolve some of the so-called sludge or solids on the bottom and recover some of this material.

I would appreciate your discussing with me what you think we can do to minimize our costs and expenses. I have a feeling that this is not as "sludgy" or as unusable as perhaps Neil Wallace believes. I would also be interested in knowing what George Mills' analysis has shown and your further thoughts on the matter.

Paul A. Goydan

PAG:klc

cc: K. E. Cogan  
G. B. Mills

# KOPPERS

Interoffice Correspondence

*Inoce*  
*3/1/83*

To John D. Palmer

From K. E. Cogan

Location St. Louis

Location Pittsburgh

Subject Time Oil

Date January 25, 1983

On January 19, Neil Wallace called and indicated that Time Oil was just getting into the RCRA program and tank Nos. 20001 and 13001 have sludge present. I have arranged for Neil Wallace to have samples taken and forwarded to St. Louis to determine if these materials can be reworked. If they can, we should institute a program to recover and reuse those solids. If they cannot be recovered, then it will be necessary to have Neil determine cleanout and disposal costs. Tank 20001 has 795 gallons and tank 13001 has 145 gallons. You indicated that this material is not in our inventory so that our cleaning costs will only include placing the material in drums and its subsequent disposal if necessary.

As soon as those samples come in, please arrange to have George Mills analyze them so that we can reach a decision early in the year on what to do with these two tanks.



K. E. Cogan

KEC:mtld

cc: P. A. Goydan

# KOPPERS

MAY 6 1982

## Interoffice Correspondence

To K. Cogan From G.B. Mills  
Location Pittsburgh K-1001 Location St. Louis  
Subject Time Oil Production of Lot WC-014 Date May 4, 1982  
Woodtox Pre-prime RTU

Subject product was manufactured 4/19/82 and the sample received at St. Louis on 4/22/82 was analyzed and found to contain 17.17% penta (RTU should contain 5% penta).

Called Neil Gallagher 4/22/82 and he said he would check and call me back. He later called and said that all components had been added, but that possibly insufficient mixing had been performed. A resample was submitted (rec'd 4/26/82 and this was found to contain 4.82% penta. Notified Gallagher and he said that he would mix for a longer time and send another sample. This was received 4/28/82 and was found to contain 5.09% penta. I then released as OK.

  
G. B. Mills

cc: J.D. Palmer

62

John Palmer

---

Neil,

3-5-82

Here are revised formulas  
for all the products that you  
produce. Please note that  
most have changes in them.

If you have any questions  
please call me or George Mills.

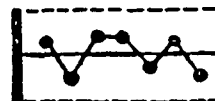
Thanks  
John



# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Woodtox Pre-Prime RTU - T Lab. Book No. \_\_\_\_\_ Date Feb. 20, 1982

Made for Portland, Oregon (Time Oil) Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL	COST PER UNIT	EXTENSION	%
5.20	.335	Penta	15.54			
0.75	.100	Paraffin Wax	7.5			
15.00	2.069	Oxo Bottoms	7.25			
0.50	.063	Nalco 6SJ 743 (6RJ 947)	7.9			
78.55	12.216	Mineral Spirits (Quick Dry)	6.43			
100.0	14.783		6.765			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

REMARKS: Cost (Per Gallon)

1. Charge Blender with oxo bottoms Nalco and 1/3 of the mineral spirits.
2. Heat to 170°F and agitate while adding wax and penta
3. Continue mixing until dissolved but heat and add remaining mineral spirits and mix unhomogenous.
4. Mail sample to St. Louis.

1000 gallon batch

#	<u>gallon</u>	
360		Penta
51		Wax
1015	140	Oxo
34	4.3	Nalco
5314	826 1/2	Mineral Spirits

DISTRIBUTION: Sales Dept. .... Tech. Svc. .... Plant Mgr. .... Plant .... Office Mgr. ....  
Purch. .... Safe File .... Lab Group .... Other .....

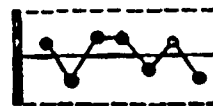
BZTO104(e)012147



# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Woodtox Preprime Conc. T Lab. Book No. \_\_\_\_\_ Date Feb. 20, 1982

Made for Time - Portland, Oregon Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
22.50	1.448	Penta	15.54			
3.25	.433	125 mp Paraffin Wax	7.5			
64.95	8.959	Oxo Bottoms	7.25			
4.00	.545	KB-3	7.34			
2.00	.253	Nalco 6SJ 743	7.9			
3.30	.513	Mineral Spirits (Quick Dry)	6.43			
100.0	12.151		8.230			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

REMARKS: Cost (Per Gallon)

### Blending Procedures

1. Meter in oxo bottoms, KB-3, and mineral spirits and Nalco
2. Heat to 180°F and circulate
3. Add wax and penta and continue circulation until completely dissolved.
4. Sample and sent to St. Louis.

### 1000 gallon batch

#	gallon	
1852		Penta
267		Wax
5345	737	Oxo Bottoms
329	45	KB-3
164.5	20.8	Nalco
272	42.3	Mineral Spirits

DISTRIBUTION: Sales Dept. .... Tech. Svc. .... Plant Mgr. .... Plant .... Office Mgr. ....  
Purch. .... Safe File .... Lab Group .... Other .....

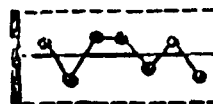
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# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Woodtox 140 Concentrate - T Lab. Book No. \_\_\_\_\_ Date Feb. 20, 1982  
Made for Portland, Oregon Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
22.00	1.416	Penta	15.54			
2.54	.339	125 mp Paraffin	7.5			
50.77	6.917	KB-3	7.34			
12.69	1.750	Oxobottoms	7.25			
12.00	1.866	Mineral Spirits	6.43			
100.0	12.288		8.138			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

REMARKS: Cost (Per Gallon)

### Blending Procedures

1. Meter in KB-3, Oxo Bottoms and Mineral Spirits
2. Heat to 180°F
3. Circulate and add wax and penta continuing to circulate until completely dissolved.
4. Sample and mail to St. Louis

### 1000 gallons batch

#'s.	Gallons
1791 Penta	-----
207 Wax	-----
4132 KB-3	563
1033 Oxo	142 1/2
977 mineral spirits	152
8140	1000 gallons

DISTRIBUTION: Sales Dept. .... Tech. Svc. .... Plant Mgr. .... Plant .... Office Mgr. ....  
Purch. .... Safe File .... Lab Group .... Other .....

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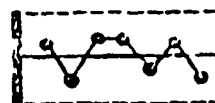




# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Woodtox 140 RTU - T Lab. Book No. \_\_\_\_\_ Date Feb. 20, 1982  
Made for Time Oil Company - Portland, Oregon Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
5.20	.335	Penta	15.54			
.60	.080	128-130 mp Paraffin	7.5			
12.00	1.635	KB-3	7.34			
3.00	.413	Oxo Bottoms	7.25			
79.20	12.317	Mineral Spirits	6.43			
100.0	14.78		6.766			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

### REMARKS: Blend Procedures

1. Charge blender with KB-3, Oxobottoms, and 1/3 of mineral spirits
2. Heat to 170°F and agitate while adding wax and penta
3. Continue mixing until dissolved, cut heat, and add remaining mineral spirits and mix until homogenous
4. Sample and mail to St. Louis

1 1000 gallon batch

#'s	Gallons
(375) 352	-----Penta
41	-----Wax
812	111 KB-3
203	28 Oxo
5359	833 1/2 Mineral Spirits

DISTRIBUTION: Sales Dept. .... Tech. Svc. .... Plant Mgr. .... Plant .... Office Mgr. ....  
Purch. .... Safe File .... Lab. Equip. .... Other .....

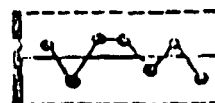
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# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Timbertox 40 Concentrate Lab. Book No. \_\_\_\_\_ Date Feb. 20, 1982  
Made for Portland, Oregon (Time Oil Co.) Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
40.5	2.606	Penta	15.54			
59.5	8.106	KB-3	7.34			
100.0	10.712		9.335			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

### REMARKS:

#### Blending Information

1. Meter in KB-3 & WTL, Heating to 170°F Max.
2. Circulate, add Penta
3. Continue circulation until dissolved
4. Cut Heat and sample and test for Penta

	<u>1000 gal. Batch</u>	
	<u>#</u>	<u>Gallon</u>
Penta	3781	243
KB-3	5554	757
	9335	1000

DISTRIBUTION: Sales Dept. .... Tech. Svc. .... Plant Mgr. .... Plant .... Office Mgr. ....  
Purch. .... Safe File .... Lab Group .... Other .....

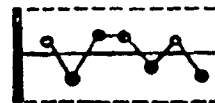
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# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product WR 340 Concentrate Lab. Book No.                      Date Feb. 20, 1982  
Made for Time - Portland Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
5.66	.755	Paraffin Wax (125-130)	7.5			
94.34	12.853	Eastman KB-3	7.34			
100.0	13.608		7.349			

DILUTION: ONE TO                      DILUENT                      LBS. PER GAL.                     

REMARKS: Blending Procedure for 1000 gallon batch

1. Meter 944 1/2 gallon KB-3 into mixer
2. Heat and circulate until 160°F
3. Add 416 lbs. Wax and circulate until dissolved.
4. Do not allow temperature to drop below 110°F until packaging completed.

Package 408 lbs. net per 55 gal. drum                     

Cost / Dm " "

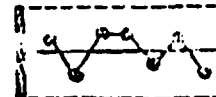
DISTRIBUTION: Sales Dept. . . . . Tech. Svc. . . . . Plant Mgr. . . . . Plant . . . . . Office Mgr. . . . .  
Purch. . . . . Safe File . . . . . Lab Group . . . . . Other . . . . .



# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product LST Co-Solvent II Lab. Book No. \_\_\_\_\_ Date February 20, 1982

Made for Portland, Oregon Chemist \_\_\_\_\_

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
30.0	4.138	Heavy Oxo Bottoms	7.25			
70.0	9.537	KB-3	7.34			
100.0	13.675		7.313			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

### REMARKS:

Packed in 55 gal. tight head drums (395 #/dr.) 20 drum minimum order requirement.

Costs: Raw Mat. \_\_\_\_\_

Drum \_\_\_\_\_

1100 gal. batch

lbs. Gal.

2413 333

5631 767

8044 1100

DISTRIBUTION: Sales Dept. .... Tech. Svc. .... Plant Mgr. .... Plant .... Office Mgr. ....  
Purch. .... Safety File .... Lab Group .... Other ....

BZTO104(e)012153

# KOPPERS

## Interoffice Correspondence

Paul Goydan K/1001  
Joe Kusar K/1001  
Rosemarie Stefanski K/1001  
Eric Yeadon K/1001  
Jack Kozak  
PamArmbruster  
Jonette Wharton K/1001

To Ken Cogan  
Location Conley, GA - K/1001  
Subject Monthly Report - December

From J. D. Palmer  
Location St. Louis, Missouri  
Date January 5, 1982

### I. ST. LOUIS INVOICING - December Accounting Month \$

	<u>% Profit</u>	<u>1981</u>	<u>1980</u>	<u>1979</u>
FPG Penta	15.0	168036	268798	171611
Customer Penta	15.0	46110	109967	96975
WTC	25.5	127325	213929	158125
CCA-C	19.8	169363	204381	108590
CCA-B	-----	-----	20140	50707
		510834	817215	586008

### II. WTC Inventory

November Closing Inventory		559572
December Purchasing		40733
December Raw Materials	40392	
Containers	341	
Penta 1408	60323	
Penta 1414	84482	
December Material Converted to Product	121773	
Cost of Product Sold		70429
DECEMBER CLOSING INVENTORY		529876

Inventory is Down-\$26586 from November report - BUT ---- at December closing our Inventory Pick-up of \$45,000 was ADDED to final totals, therefore inventory was actually down\$71 586 from the November report.

### III. RAW MATERIALS

Eastman is offering a TVA of \$0.02/lb. We are taking advantage of this by moving it into TIME and St. Louis.

We will be purchasing several raw materials for both St. Louis and Portland as our inventories are at a very low point.

## Interoffice Correspondence

Page 2

BZTO104(e)012155

# KOPPERS

## Interoffice Correspondence

To \_\_\_\_\_

From \_\_\_\_\_

Location \_\_\_\_\_

Location \_\_\_\_\_

Subject \_\_\_\_\_

Date \_\_\_\_\_

Page 3

Harold is continuing to update our labels and resolve any problems we have with exporting our products.

### V. Newark, CCA-CCA Production

<u>Newark, CA Plant</u>	<u>Produced</u>	<u>Shipped</u>
Oxide lbs.	64857	71780
<u>Production Schedule for January</u>		
Oxide lbs.	142000	
<u>Production Schedule of February</u>	90000	
<u>Production Schedule for March</u>	90000	

Because of delays in ICD Chrome Don Marion and I have decided to purchase two loads of chrome from Jones-Hamilton. This is needed because we have orders on the books and need production to meet requirements.

John Palmer

/pa

# KOPPERS

## Interoffice Correspondence

To D. F. Marion  
Location K/8011  
Subject TIME OIL COMPANY

From John D. Palmer  
Location St. Louis, Missouri  
Date October 29, 1981

The cost of servicing our West Coast Customers from St. Louis is as follows:

Truck loads of drums can be shipped from St. Louis to Portland, Oregon for a cost of approximately \$37.00/drum which equates to \$0.67/gallon.

The freight on bulk shipments of Woodtox Preprime by tankcar to Portland would add \$0.47/gallon to the product. Using St. Louis manufacturing costs for Woodtox Preprime - T, and adding the freight the cost would be \$2.11/gallon. (Present selling price at 21% margin on the west coast is \$2.20/gallon).

If we manufactured Woodtox Preprime - T Concentrate and shipped it to a bulk location to be blended with mineral spirits, the final cost of Woodtox Preprime T Ready-to-Use would be \$1.851/gallon excluding a blend fee. Assuming a blend and storage fee of \$0.10/gallon the cost would still be cheaper than shipping direct to a customer.

John D. Palmer

JDP/pa

cc: Mr. Ken Cogan  
Mr. J. D. Hite K/1001  
Mr. Paul Goydan K/1001



# KOPPERS

## Interoffice Correspondence

To D. F. Marion  
Location K/801  
Subject Time Oil Company

From J. D. Hite  
Location K/1001  
Date October 16, 1981

I believe it is extremely important that we not procrastinate in making decisions relative to our direction in serving our West Coast millwork business. Along with your evaluations of the Time Oil proposals, we must weigh the cost of servicing that business from St. Louis. The St. Louis production evaluation should include direct tank car or bulk truck delivery to customers from St. Louis as well as production of St. Louis and transportation to a bulk terminal on the West Coast for subsequent transport to customers. We should also look at drum production in St. Louis railing the product to the West Coast for inventory in a warehouse for final distribution to accounts from a contract warehouse.

Obviously, I hope that we are also looking for alternate production locations on the West Coast.

JDH:jw

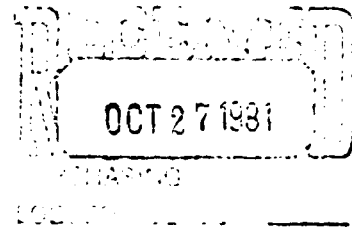
John D. Hite  
Ext. 2445

cc: K. E. Cogan  
P. A. Goydan  
→ J. D. Palmer

cc: Don Marion K/800  
Paul Goydan K/1001

# KOPPERS

Interoffice Correspondence



To Ken Cogan  
Location Conley, GA  
Subject Your 10-12-81 Memo  
on TIME OIL

From John Palmer  
Location St. Louis  
Date October 23, 1981

1. In regards to your first question, we are not aware of any item blended that was not specifically covered in the agreement or in the amended schedule.

2. George Mills is reviewing the written instructions as they regard to manufacturing. I have reviewed with Andy Anderson the instructions as to the safe handling of the materials. He said to use our safety pages from the ACCIDENT PREVENTION PROGRAM GUIDEBOOK. Those pertinent parts are copied for your approval. (Attached)

3. TIME OIL does not have any hazardous waste at the present time. They do have some tanks that haven't been cleaned out in years and they do need to be cleaned.

4. As discussed with you earlier, Neil Gallagher of TIME informed me that the complaints occur after taking the mask off.

The masks used are WILSON FULL FACE masks with R-21 filters and R-10 dust filters. These were recommended to Neil by Bob Simmons.

5. I am still reviewing the JONES-HAMILTON instructions - some of which (CCA) are attached. These were written in 1976-77.

John D. Palmer

JDP/pa

61

# KOPPERS

October 7, 1981

Mr. Neil Gallagher  
TIME OIL COMPANY  
P. O. Box 3117  
12005 N. Burgard  
St. Johns Station  
Portland, Oregon 97203

Dear Neil:

Attached are the formulation changes for:

WOODTOX PRE-PRIME - T READY-TO-USE  
WOODTOX PRE-PRIME - T CONCENTRATE

Please replace in your formulation book and destroy the present formula.

Please acknowledge the bottom of this letter and return to my attention when this has been completed.

Again, if you have any questions, please let me know.

Sincerely yours,

John D. Palmer  
Production Manager

/pa

Attachments

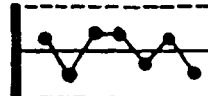
cc: Mr. Ken Cogan - Conley, GA



# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Woodtox Pre-Prime RTU - T Lab. Book No. \_\_\_\_\_ Date September 20, 1981

Made for Portland, Oregon (Time Oil) Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
5.20	.335	Penta	15.54			
0.75	.100	Paraffin Wax	7.5			
15.00	2.098	Oxo Bottoms	7.15			
0.50	.063	Nalco 6SJ 743 (6RJ 947)	7.9			
78.55	12.048	Mineral Spirits (Quick Dry)	6.52			
100.0	14.644		6.829			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

### REMARKS:

1. Charge Blender with oxo bottoms Nalco and 1/3 of the mineral spirits.
2. Heat to 170°F and agitate while adding wax and penta
3. Continue mixing until dissolved but heat and add remaining mineral spirits and mix unhomogenous.
4. Mail sample to St. Louis.

1000 gallon batch

#	<u>gallon</u>	
360		Penta
52		Wax
1024	143	Oxo
34	4.3	Nalco
5364	823	Mineral Spirits

DISTRIBUTION: Sales Dept. . . . . Tech. Svc. . . . . Plant Mgr. . . . . Plant . . . . . Office Mgr. . . . .  
Purch. . . . . Safe File . . . . . Lab Group . . . . . Other . . . . .

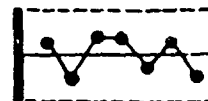
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# WOOD TREATING CHEMICALS DEPT.

KOPPERS COMPANY, INC.

5137 SOUTHWEST AVENUE, ST. LOUIS, MISSOURI 63110



## CONFIDENTIAL FORMULA RECORD

Product Woodtox Preprime Conc. T Lab. Book No. \_\_\_\_\_ Date September 20, 1981

Made for Time - Portland, Oregon Chemist G. B. Mills

POUNDS	GALLONS	MATERIAL	POUNDS PER GAL.	COST PER UNIT	EXTENSION	%
22.50	1.448	Penta	15.54			
3.25	.433	125 mp Paraffin Wax	7.5			
64.95	9.122	Oxo Bottoms	7.15			
4.00	.545	KB-3	7.34			
2.00	.253	Nalco 6SJ 743	7.9			
3.30	.506	Mineral Spirits (Quick Dry)	6.52			
100.0	12.307		8.13			

DILUTION: ONE TO \_\_\_\_\_ DILUENT \_\_\_\_\_ LBS. PER GAL. \_\_\_\_\_

REMARKS:

### Blending Procedures.

1. Meter in oxo bottoms, KB-3, and mineral spirits and Nalco
2. Heat to 180°F and circulate
3. Add wax and penta and continue circulation until completely dissolved.
4. Sample and sent to St. Louis.

### 1000 gallon batch

#	gallon	
1829		Penta
264		Wax
5280	728.5	Oxo Bottoms
325	45	KB-3
162.6	20.5	Nalco
268	41	Mineral Spirits

DISTRIBUTION: Sales Dept. . . . . Tech. Svc. . . . . Plant Mgr. . . . . Plant . . . . . Office Mgr. . . . .  
Purch. . . . . Safe File . . . . . Lab Group . . . . . Other . . . . .

BZTO104(e)012162

# KOPPERS

## Interoffice Correspondence

*K. E. Cogsw  
Conley, GA*

To John D. Palmer  
Location St. Louis, MO  
Subject Time Oil Company  
Visit - September 28, 1981 and  
September 30, 1981

From Donald F. Marion  
Location K-801  
Date October 5, 1981

On Monday, September 28, 1981, I visited with Mr. Robert Abendroth and Mr. Neil Wallis of Time Oil Company in Seattle, Washington and on Wednesday, September 30, 1981, visited with Mr. Wallis and Mr. Neil Gallagher at the Time Oil Company blending facility in Portland, Oregon. During my visit to Seattle, we thoroughly reviewed the 1967 contract which has been renewed for five (5) year increments thru March 31, 1982. Mr. Abendroth indicated that they still would be interested in pursuing a new agreement, but due to the current average labor cost of \$16.04 per hour and the environmental impact, they would have to review their entire economic basis for a new agreement. Attached for your review are two (2) memorandums that were given to me by Mr. Abendroth. These detail the concerns of Mr. Neil Gallagher and Mr. John Donham and are an indication of the needed upgrading prior to pursuing a new agreement.

In order to maintain your files up to date, I have also enclosed a copy of the amended and original agreement and a copy of plot plan 1356.

I am confident that Mr. Abendroth and Mr. Wallis will be able to put together an agreement for 1982. However, I am concerned about how expensive this new contract will be. I believe that we should seriously consider obtaining one or two additional proposals in light of our March 31, 1982 deadline. We would then be in a position to evaluate the entire situation well in advance of this deadline. After you have had an opportunity to review the attached information, let's discuss our approach for the next few months.

*Donald F. Marion*  
Donald F. Marion

DFM/hls

cc: J. D. Hite  
K. E. Cogsw  
P. A. Goydan

*Q<sup>3</sup>*  
[ Do we instruct how to mix?  
Do we recommend safety gear?  
Who is responsible for medical inspection?  
How are hazardous waste handled?

63

From the desk of

PAUL A. GOYDAN

J. Hite

K. Cogon

These deferrals @ Time will  
cost us a bundle of \$.

I believe we will be better  
off trying to Sell the TANKS

& equipment to Time &

seek another blender who  
will Toll for us with

their Equipment & Maintain  
the Environmental & Health aspects.

We can't Monitor our Investment  
existing in Pittsburgh or St Louis  
or Be Responsible for Maintenance PAV

RECEIVED  
OCT 15 1981  
REGISTERED

M E M O R A N D U M

August 27, 1981

TO: R.D. Abendroth Seattle  
FROM: ✓ John Denham Seattle  
SUBJECT: WOOD TREATING (KOPPERS COMPANY)

Reference last sentence of my August 17, 1981 memo, copy attached.

My August 21, 1981 inspection of this operation revealed the following deficiencies:

A. TANK FARM OUTSIDE WAREHOUSE

1. Tanks 20001 and 13001 are too close to warehouse. (relocation needed to distance at least five feet from building)
2. Tanks are rusted in many places. (cleaning and painting white needed)
3. No stairways, railings or walkways exist on horizontal tanks 3010, 6008, 8005, 8006 and 8007. (installation needed)
4. No ladder cages exist on tanks 20002, 20003, and 38009. Walkways and railings are damaged, missing or improper. (installation needed)
5. Several heating coils in 1400 gallon heating tank under platform do not work. (replacement needed)
6. Deck atop 1400 gallon heating tank is damaged, unsafe to walk on and permits vapors from this volatile mixture to readily escape into working area. (new metal deck needed)
7. No suction pipelines or manifold exist at rail car siding for unloading purposes. (installation needed)
8. No manifold system exists on incoming product lines for receipt, blending or storage purposes. (manifold needed)
9. Valves on tanks and lines are not maintained at all. (repair and testing or replacement needed)



10. Valves, lines, pumps, hoses and tanks (in some places) are thickly covered with product. (steam cleaning badly needed)
11. Several valves in system are not chained and locked. (installation needed)
12. Valve at end of isolated line to tank 38009 is leaking product onto ground. (replacement valve needed)
13. Pipeline supports are improper and inadequate. (replacement needed)
14. Pipelines are not painted or identified as to product content. (maintenance needed)
15. Product identification is not on all tanks. (signs needed)
16. Ground area at end of pipelines is saturated with product about four inches deep. (dirt removal and replacement needed)
17. Pump journal cover is not secured to pump. (four sheetmetal screws needed)
18. Cargo hoses are not marked or recorded to show condition, manufacturer, dates inspected or pressure tested. Some are damaged. (repair and recording needed)
19. Weeds are prevalent in quantity within diked compound. Good fire hazard. (weed removal needed)
20. Rail car siding wheel bumpers are not fastened to track. (repair needed)
21. Fire extinguisher on platform by 1400 gallon heating tank is not tagged, has not been inspected for operational capability and is fixed so it can not work, even if needed. (replacement system needed)
22. No spill control system exists at rail car rack or within diked area. One was recommended in 1975, copy attached, but apparently not approved by management. (installation needed)

#### B. INSIDE WAREHOUSE

1. Operation is not isolated. Fumes generated during process can readily enter lube oil warehousing area and overcome any individual not wearing appropriate respiratory equipment. (wall needed in warehouse to isolate operation)

2. Ventilation inadequate even with doors open. (installation of three - four foot sucker fans needed - one in south wall, one in east wall and one over 1400 gallon heating tank)
3. No spill control system exists in building. Now liquid can run all over area and out of doors at will. (floor sloping and drain installation needed)
4. Four ceiling joists are damaged severely from fork lift operation. (repair and/or replacement beams needed)
5. No clearance signs exist on beams to alert fork lift operators. (signs needed)
6. Lighting is inadequate for the work. Several bulbs are out but even with all lights on, only one candle power was recorded during middle of the day bright daylight. (additional lighting to a minimum of five foot candles needed. An assist to this would be to paint ceiling white)
7. Work area is caked with product and very very dirty. (steam cleaning needed badly)
8. Small floor fan thickly covered with product. Fire hazard. (cleaning needed)
9. No emergency deluge shower exists. Material handled can be injurious. (shower would help. Eyewash should be included on such a permanent hookup)

Nearly all of these deficiencies have been reported previously.

JPD/mm

Attachments

## WOOD TREATING

Modifications needed per Neil Wallis and Neil Gallagher 8/18/81.

### a. Outside

- ✓1. Install fixed manifold system.
- ✓2. Repair or replace existing valves.
- ✓3. Install spill control system. *(within warehouse)*
- ✓4. Install ladders and walkways on horizontal tanks 3010, 6008, 8005, 8006 and 8007.
- ~~40-20F~~ ✓5. Install cages on tanks 20002, 20003, and 38009.  
~~PR COST. YET.~~
- ~~ELECTRICAL~~ ✓6. Replace 2 or 3 heating coils in heating tanks.
- ✓7. Install pipe suction lines (in lieu of hoses) at rail car siding.

### b. Inside Warehouse

- ✓1. Install shower and fixed water system eyewash.
- ~~NO ELECTRICAL~~ ✓2. Improve lighting.
- ✓3. ~~corrected~~ Repair 2 ceiling joists and replace 2 ceiling joists.
- ✓4. Install spill collection system.
- ✓5. Install ventilation.

Est Cost -  $\frac{\$25,000}{36} = \$695$  - basic  
plus interest cost



TANKS

1 mineral Spirits tank	40 M
1 core tank	15 M
1 Fuel Oil Prod	10 M
1 meter	
1 mix pump	
1 loading pump	



Time Oil Tank Clean out

Crosby & Overton

503-283-1150

Bob ~~Crosby~~

will visit 5/26 & call them on Friday

21

POWER MASTER

503-257-8801

Geo. DODSON = They have vacuum Eqp't

They will check with N. Wallace @ Tame oil

Cost based on Time & Material basis  
(have cleaned Shell Crude oil tanks)

\$145/hr for big truck extra man \$16.50/hr  
Truck & helper

16 yd

9 yd truck \$109/HR

Ken Zier will have Gas cell back  
Wed 10/12/72

A J. Zinda Co. 503-226-4341

Jina Tenney

# KOPPERS

## Interoffice Correspondence

To SEE BELOW  
Location --  
Subject WOODTOX 140T RTU

From W. J. Baldwin  
Location K-700  
Date April 27, 1981

TO: R. D. Arsenault  
P. A. Goydan  
~~R. F. Simmons~~  
P. Armbruster  
J. D. Palmer

J. S. Sebbens  
C. W. Flickinger  
M. S. Marino  
W. H. Lederer

Due to a recent request for a Material Safety Data Sheet on subject product and the length of time since its last review, the literature has been revised.

Please destroy the sheets dated September, 1975 and May, 1977-- replace with the attached.

*Bill B.*

W. J. Baldwin

WJB:dsg  
Attachment

Mr. Neil Gallagher  
Time-Oil Company  
P. O. Box 03117  
Portland, Oregon 97203

Attached is a copy of our new APRIL 1981 MSDS on WOODTOX 140 T Ready-to-Use - made at your Portland Blending facility. Please replace this copy in your files and discard sheets as dated above.  
FILE

John D. Palmer  
Plant Manager  
St. Louis, Missouri -  
Koppers Company, Inc.

April 29, 1981



# KOPPERS

## Interoffice Correspondence

To R. F. Simmons  
Location FPG-St. Louis, MO  
Subject Operating agreement and  
lease of tanks -  
Portland, Oregon

From Real Estate Section  
Location Pittsburgh  
Date February 3, 1981

The attached letter dated January 30, 1981 covers the captioned subject. We presume that your office will negotiate the new agreement.



T. F. McGuire

TFM/smk  
Attachment

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

PHONE 285-2400  
CABLE ADDRESS TIME OIL

~~TIME~~  
~~TEB~~ MAP

FEB 3 1981

BAK SAF

FILE

January 30, 1981

*Mac*  
*Is Simmons to*  
*negotiate with Time?*  
*B.*

T. F. McGuire  
Koppers Company  
Room 2900, Koppers Building  
Pittsburg, PA 15219

Dear Mr. McGuire:

Enclosed is a copy of a letter to your Mr. Simmons date January 28, 1981 advising of our election to terminate the agreement of March 1st, 1967 under which we have been storing, blending and sipping certain products of yours at our Portland, Oregon terminal.

Should you desire to discuss a new agreement with us I suggest you contact Robt. Ab endroth at this office.

Your very truly,

TIME OIL CO.

*A. A. Schneider*  
A. A. Schneider  
Vice-President

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
RENO  
RICHMOND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

2737 W. COMMODORE WAY, P.O. BOX 24447, TERMINAL ANNEX, SEATTLE, WA 98124

January 28, 1981

Wood Treating Chemicals Dept.  
Koppers Company  
5137 Southwest Ave.  
St. Louis, Missouri 63110

Attention: Mr. Robt. F. Simmons

Gentlemen:

Under date of March 1st, 1967 we entered into an Agreement with you to provide certain labor and services to receive, store, handle, blend and redeliver certain products of yours at our Portland, Oregon terminal.

The term of said agreement ran from April 1, 1967 to March 31, 1972 and automatically renewed for two additional terms of five years each, the present term expiring March 31, 1982.

As discussed with you on the phone this date, we are hereby giving you notice of our election to terminate said Agreement effective March 31, 1982.

Very truly yours,

TIME OIL CO.

A. A. Schneider  
Vice-President

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 03117, ST. JOHNS STATION, PORTLAND, OREGON 97203

January 20, 1981

Mr. R. F. Simmons  
Koppers Company, Inc.  
Wood Treating Chemicals Dept.  
5137 Southwest Avenue  
St. Louis, Mo. 63110

Dear Bob:

The blending and drum filling charges on your invoices starting January 1, 1981 will be increased by 10.31%. This is due to the fact that our average wage rates have increased since the last increase was put into effect December 1, 1978.

Our average wage rate is now \$9.17 per hour.

Paragraph 9c reads, "If Average Wage rates exceeds \$3.875 per hour the handling and transfer charges shall be increased by a percentage equal to 25% of that percent of \$3.875 which the excess of the average wage rate constitutes."

25% of  $\frac{9.17 - 3.875}{3.875}$  equals 34.15%

We made an increase of 23.84% since the beginning of the contract, this percentage deducted from 34.15% give the present increase of 10.31%.

Yours very truly,

*Newton P. Lesh*

Newton P. Lesh

NPL/s

(2626)  
MAC McQUIRE CALLED 1/21 TO ADVISE AGREEMENT EXT 2/28/82  
AL SCHNEIDER CALLED 1/28. (FROM SEATTLE) TO SAY  
TIME WANTS TO CANCEL AT EXT. BASICALLY DUE TO  
PRICING.  
McQUIRE ADVISED I TO WRITE LTR REQUESTING  
CONSIDERATION NEW CONTRACT.

December 16, 1980

Mr. Neil Gallagher  
Time Oil Co.  
P. O. Box 03117  
St. John's Station  
Portland, OR 97203

Dear Neil:

EPA has transferred pentachlorophenol from the list of acutely hazardous wastes (Section 261.33 (E)) to the list of chemicals classified as toxic wastes (Section 261.33 (F)) if discarded under RCRA regulations (45 FR 78532). Penta's new hazardous waste number is U242.

To us, this means that empty drums from penta containing products and penta bags are not subject to RCRA regulations. (Previously, under the regulation, containers were exempt only after triple rinsing or equivalent method of cleaning). Further now, drums, bags and other packaging forms that are stored and/or transported prior to being used, reused, recycled, or reclaimed are not subject to RCRA regulations.

We are not sure at this point if your state has regulations that might provide any other restriction on disposal of empty penta bag or used, unrinsed drums, although we assume this RCRA down regulation will allow you to again return to simple trash disposal of empty bags and disposal of used drums to reconditioners after proper rinsing. We will keep you advised of any regulatory restriction we learn of applicable to your operation and trust you will likewise keep us informed if you hear it locally first.

Best regards,

R. F. Simmons,  
Operations Manager

RFS/pds

cc: P. A. Goydan  
H. P. Struessel  
P. Ambruster

# KOPPERS

## Interoffice Correspondence

To Alex Saucedo  
Ken Luse

Location \_\_\_\_\_

Subject Order Entry - Time Oil Co. &

From R. F. Simmons

Location St. Louis, Mo.

Date May 15, 1979

Jones-Hamilton Co.

We have occasionally had verbal orders misunderstood and improperly shipped from these locations because of the misunderstanding.

Today, in conversation with Neil Gallagher at Time Oil we have had to agree that no orders will be shipped until confirming written order is received at the plant, with complete shipping information. This is a result of one of those instances of either incomplete information being given by telephone order or the plant improperly handling; in any event, neither of us want to accept additional expenses incurred.

The same problem has occurred at Newark, very infrequently, but it has happened.

We have likewise previously asked your cooperation in securing and transmitting written orders and to large measure, had noticeable improvement; this is greatly appreciated.

Now with our latest problem however, we see no alternative but to insist upon complete written orders being at the plants prior to shipment to alleviate any further misunderstandings.

R. F. Simmons

RFS/pds

February 12, 1979

Mr. Neil Gallagher  
Time Oil Co.  
P. O. Box 03117  
St. John's Station  
Portland, Oregon 97203

Dear Neil:

Enclosed find a copy of the National Institute of Occupational Safety & Health's guide for pesticide formulators. Whereas your only pesticide formulation is for us, this booklet is basically pertinent information for all industry and is specifically aimed at those plants which handle chemicals and petroleum products.

I hope this booklet enables and aids you to stay abreast of federal standards. Note on the inside front cover addition guides prepared for specific industries, some of which may be of interest to you.

Yours truly,

R. F. Simmons,  
Operations Manager

RFS/pds

# KOPPERS

May 19, 1978

Mr. Neil Gallagher  
Time Oil Co.  
12005 N. Burgard Rd.  
Portland, Oregon 97203

Dear Neil:

Upon my visit in February, we left you a booklet which contains sections concerning:

- Product Data
- Pentachlorophenol & Solution Safety Precautions
- Product Material Safety Data Sheets
- Raw Material Data Sheets
- Tank Entering & Cleaning Procedure (Used by Koppers)

Confirming our verbal discussion, this information was given to you as an aid for possible improvement of your understanding of our products and the products you manufacture for us and should not be taken as mandatory recommendations or procedures to be followed. Koppers assumes no liability for the accuracy of the information and it should be used as reference material only.

It is suggested by OSHA that the Product and Raw Material Safety Data Sheets be available for easy reference by your plant workers. We at Koppers incorporate these in our Safety Program, review the program with our workers and have them sign a statement that such a review has been presented and that they understand the safety procedures they should follow. It is, of course, Time Oil's decision to follow or discard these comments. We attach a sample statement that is retained in our employee's files, and recommend an annual review and statement updating. (Exhibit A)

Again, to assist you in establishing a medical surveillance procedure, enclosed you will find a medical examination record. (Exhibit B) The standard items on the form are done upon pre-employment examination; upon annual re-examination our employees are subject to a physical examination that directs its attention to detecting pentachlorophenol exposures. The examination concentrates on the following:



-2-

1. A thorough occupational history with respect to possible exposures to pentachlorophenol and other chemicals.
2. A thorough skin examination checking for acne-like lesions.
3. An examination for chronic irritations of the nose and throat.
4. An examination of the eyes for cornea and iris damage.
5. Blood pressure tests in the standing and sitting position.
6. An examination of the abdomen for possible liver enlargement and/or tenderness.
7. A check on neurological functions in the arms and legs.
8. A chest x-ray.
9. Urinalysis including a microscopic examination, sugar and albumin.
10. Blood chemistry analysis, SMA-12 including blood sugar.

The doctor provides a short narrative explicitly noting abnormalities, particularly of these 10 items.

All of the employees at the St. Louis operation who have a potential exposure are required to participate in this program. After two years there have been no abnormal results from this examination program.

The physicians performing the examinations have been provided with listings of the chemicals handled. These physicians retain the records of the examinations and have been instructed to contact the employee and local management if abnormalities occur.

This extensive program was started to determine the effectiveness of the engineering controls and personal protective equipment programs that were designed to prevent employee exposure to chemicals. It is also possible to determine if there would be any adverse effects to our employees who handle chemicals. The application of this program is audited during routine loss prevention surveys.

-3-

Good personal hygiene practices cannot be overemphasized, therefore we insist on the following standards for employees working with chemicals:

All plant employees-

1. Upon arrival to begin work, wash hands, arms, face and neck with soap and water and rinse thoroughly. This is to remove any trace of oily film that accumulates on the skin since chlorophenols from penta are oil soluble and an oily skin greatly increases the probability of skin absorption of the chlorophenols.
2. This washing is to be repeated at each and every coffee, smoke or lunch break prior to eating or smoking.
3. Each employee is provided a daily change of clothing which should be utilized on plant. Work uniforms are not to be worn away from the plant, nor should street clothing be worn in the plant. An additional uniform clothing change should be on hand for unexpected accidental chemical wetting.
4. Safety items - gloves, goggles, respirators, air-pacs, shoes, boots, rain gear, protective suits and helmets - are all provided and instructions given for usage. This equipment is to be maintained, cleaned, inspected, and used as has been instructed.
5. Finally, each plant employee is required to shower thoroughly at his shift-end, prior to leaving the plant.

Again please note, Koppers has provided this material to you as reference and guidance, not for specific recommendation or required procedure under our blending contract. Advise if you have further questions.

Sincerely,



R. F. Simmons,  
Operations Manager

RFS/pc

The following procedures were reviewed and understood at

\_\_\_\_\_ (location) by \_\_\_\_\_

(supervisor's name) with \_\_\_\_\_ (employee) on

\_\_\_\_\_ (date).

Pentachlorophenol & Solution Safety Precautions.  
Material Safety Data Sheets

(List)

- 1.
  - 2.
  - 3.
  - 4.
- etc.

Lock-out Procedure.  
Tank Entering & Cleaning Procedure.

Exhibit A

# MEDICAL EXAMINATION RECORD

## KOPPERS COMPANY, INC.

DATE \_\_\_\_\_

NAME \_\_\_\_\_ DATE OF BIRTH \_\_\_\_\_ SEX \_\_\_\_\_ M. S. W. D. SEP.

ADDRESS \_\_\_\_\_ PHONE \_\_\_\_\_ DIVISION \_\_\_\_\_ LOCATION \_\_\_\_\_

PREVIOUS OCCUPATIONS: (INDICATE EXPOSURES TO DUST AND SKIN IRRITANTS): \_\_\_\_\_

OCCUPATION FOR WHICH EXAMINED: \_\_\_\_\_

<b>FAMILY MEDICAL HISTORY</b>	CANCER	DIABETES	EPILEPSY	HEART DISEASE	HIGH BLOOD PRESSURE	MENTAL DISEASE	STROKE	TUBERCULOSIS	
<b>PERSONAL MEDICAL HISTORY</b>	ALLERGY	EPILEPSY	HERNIA	MALARIA	SKIN CONDITION	PLEURISY	PNEUMONIA	TUBERCULOSIS	RHEUMATISM
	VACCINATIONS		OPERATIONS			MEDICAL ATTENTION PAST 2 YEARS			
	COMPENSATION FOR INDUSTRIAL INJURY		NO	YES	WHEN	FOR WHAT			
			NO	YES	WHEN	WHAT KIND			
	OCCUPATIONAL DISEASE		NO	YES	WHEN	WHAT KIND			
	MENSTRUAL HISTORY		REGULAR		PAINFUL		LOST TIME		

HAVE YOU ANY PHYSICAL DEFECTS OR ALLERGIES WHICH MIGHT MAKE IT INADVISABLE TO ACCEPT EMPLOYMENT IN THE JOB FOR WHICH EXAMINED: \_\_\_\_\_

NAME OF FAMILY DOCTOR: \_\_\_\_\_

Exhibit B

I CERTIFY THE ABOVE STATEMENTS TO BE TRUE AND CORRECT

APPLICANT'S SIGNATURE \_\_\_\_\_

BZT0104(e)012185

BEFORE THE STATE OF OREGON WORKERS' COMPENSATION DEPARTMENT  
ACCIDENT PREVENTION DIVISION  
Labor and Industries Building  
Salem, Oregon 97310

In the Matter of the Alleged Violation )  
of the OREGON SAFE EMPLOYMENT ACT. )  
By: Time Oil Co.

CITATION AND NOTICE  
OF PENALTY

To: Mr. Newton P. Lesh, Vice-President  
Time Oil Co.  
12005 North Burgard  
Portland, Oregon 97203

Employer I.D. No.: 521536-3-009  
Citation No.: D7255-024-78  
Date Issued: April 6, 1978

An inspection of a workplace under your ownership, operation or control located at  
or near 12005 North Burgard, Portland, Oregon

and described as follows: petroleum products wholesale

was conducted on October 13, 1977

On the basis of the inspection it is alleged that you have violated the Oregon Safe  
Employment Act, ORS Chapter 654, as alleged on the attached Exhibit "A" and  
incorporated herein by reference.

The penalty for all violations is: NONE

The "Notice of Correction" card must be received by: May 8, 1978

THE LAW REQUIRES THAT A COPY OF THIS CITATION BE PROMPTLY POSTED IN A CONSPICUOUS  
MANNER ABOUT YOUR WORKPLACE AND IN A SUFFICIENT NUMBER OF PLACES TO INFORM YOUR  
WORKERS OF THE FACTS. IT SHALL BE PROMINENTLY POSTED FOR A PERIOD OF 3 DAYS OR  
UNTIL THE VIOLATION IS CORRECTED, WHICHEVER OCCURS LAST.

EMPLOYER: SEE REVERSE SIDE OF THIS FORM FOR RIGHTS AND  
RESPONSIBILITIES REGARDING THIS CITATION

ACCIDENT PREVENTION DIVISION

  
Sanction Officer

R8219:mh

RIGHTS OF EMPLOYEES

Any employee or representative of employees who believes that any period of time fixed  
in this Citation for the correction of alleged violations is unreasonable has the  
right to request a hearing by submitting a letter to the Workers' Compensation Department,  
Safety Hearings Clerk, Hearings Division, Labor and Industries Building, Salem, Oregon  
97310, within 20 days of your employer's receipt of this Citation.

cc: C. T. Corporation System

BZTO104(e)012186

## EXHIBIT "A"

Employer Name: Time Oil Co.

Date Issued: April 6, 1978

Employer I.D. No.: 521536-3-009

Citation No.: D7255-024-78

Item No.	Standard Allegedly Violated OAR Chap. 437 /436	Description of Alleged Violation	Date Correction Required	Penalty						
1.	22-011(2)	<p>Although the following employees were exposed to known health hazards they were inadequately informed as to the nature of the hazards, the measures taken to prevent and control such hazards, or the proper methods of utilizing such control measures.</p> <table><tr><th>Employee / Location</th><th>Hazard</th></tr><tr><td>1. Don Stell - Mixing Area</td><td>Pentachlorophenol</td></tr><tr><td>2. David Wood Mixing Area</td><td>Pentachlorophenol</td></tr></table> <p>within the compliance deadline the firm must undertake one of the following:</p> <p>A. Provide adequate information or training to affected employees by internal efforts and/or by the firm's Workmen's Compensation carrier,or,</p> <p>B. In cooperation with the Occupational Health Section prepare, develop and obtain approval of an employee information program. This program shall be designed to insure that employees are adequately informed of the health hazards to which they are exposed and the measures necessary to control such exposures.</p> <p>(Complied with at time of inspection). FIRST INSTANCE VIOLATION-----\$25.00</p>	Employee / Location	Hazard	1. Don Stell - Mixing Area	Pentachlorophenol	2. David Wood Mixing Area	Pentachlorophenol	N/A	SUSPENDED
Employee / Location	Hazard									
1. Don Stell - Mixing Area	Pentachlorophenol									
2. David Wood Mixing Area	Pentachlorophenol									
2.	22-069 (4)(b)(1)	<p>There were no written standard operating procedures governing the selection and use of respirators. FIRST INSTANCE VIOLATION-\$0.00</p>	5-6-78	SUSPENDED						
3.	22-069 (4)(e)(5) (1)	<p>Don Stell and David Wood, who were wearing respirators, had full beards which interferred with an effective face seal. (Complied with at time of inspection). FIRST INSTANCE VIOLATION-----\$0.00</p>	N/A	SUSPENDED						
4.	7-5-1 & 7-2-1	<p>Boots and raingear made of material impervious to pentachlorophenol were not provided to employees during mixing and filling operations when it was possible for this substance to come in contact with the employees skin. FIRST INSTANCE VIOLATION-----\$15.00</p>	5-6-78	SUSPENDED						

Page 1 of 2 Pages

Total Penalty

## EXHIBIT "A"

Employer Name: Time Oil Co.

Date Issued: April 6, 1978

Employer I.D. No.: 521536-3-009

Citation No.: D7255-024-78

Item No.	Standard Allegedly Violated OAR Chap. 437 /436	Description of Alleged Violation	Date Correction Required	Penalty
5.	7-3-6	Adequate eye protection was not provided for employees during mixing and filling operations as evidenced by the safety glasses provided that did not prevent splashes from coming up under the bottom rim and entering their eyes. FIRST INSTANCE VIOLATION-----\$35.00	5-6-78	SUSPENDED
6.	22-060(12)	There was no eye wash fountain in the warehouse area where pentachlorophenol was handled. FIRST INSTANCE VIOLATION-----\$25.00	5-6-78	SUSPENDED
7.	22-015 (1)(a)	In the warehouse area where pentachlorophenol was stored and mixed there was no warning sign or other equally effective means of calling attention to such hazards at their location where the hazards exist. FIRST INSTANCE VIOLATION-----\$0.00	4-20-78	SUSPENDED

Page 2 of 2 Pages

Total Penalty

NONE

cc: F. M. Klasnick  
Miss Edythe Emanuel

# KOPPERS

## Interoffice Correspondence

To Ms. Sharyn Ott From Pat Coleman  
Location Real Estate Section K-1928 Location St. Louis, Mo.  
Subject Oregon Personal Property Tax Figures Date January 26, 1978

Sharyn, the following are inventory figures by month, for  
inventory located at Time Oil Co. Portland, Oregon for 1977.

January	\$ 81,161.36
February	97,732.92
March	88,063.96
April	84,147.62
May	83,812.30
June	100,782.62
July	95,575.74
August	85,108.18
September	101,539.57
October	109,651.63
November	115,057.39
December	106,802.88

Pat Coleman



# KOPPERS

## Interoffice Correspondence


To R. F. Simmons  
Location WTC - St. Louis  
Subject Time Oil

From T. A. Beatty  
Location Pittsburgh - K/1001  
Date January 13, 1978

Please make absolutely sure that you give Neil Gallagher a written confirmation of your comments offered in your meeting with Time Oil regarding penta safety. You should specifically declare that Koppers assumes no liability for the accuracy of the information presented and that the information is to be regarded as reference material and not for specific recommendations or required procedures under the contract we have with Time Oil.

Please let me see a copy of your confirmation to Mr. Gallagher.

TAB:jw

  
T. A. Beatty  
Ext. 2448

cc: G. L. Daugherty

# KOPPERS

## Interoffice Correspondence

To R. F. Simmons  
Location St. Louis  
Subject Penta Handling Procedures  
(Contract Blenders)

From G. L. Daugherty  
Location Pittsburgh  
Date January 5, 1978

Enclosed are copies of pertinent information taken from our "Accident Prevention Program". The general policy of Loss Prevention normally forbids release of this information due to liability concerns. Since we are dealing with contract blenders, we must give them information for proper worker safety.

As I mentioned on the phone, workers are required to sign a form that a supervisor has reviewed the "program" with them and that they understand the safety procedures. People handling chemicals such as penta must review the program periodically and also note this on the form. We do not have a standard form as I thought. In any event, the workers note the above information on a document which is kept in their files.

Any information you relate to our contract blenders, whether pertaining to safe handling or medical surveillance, must be given strictly as information which may help them establish or improve their own safety program. You should establish at an early point in your discussions that these are not recommendations or procedures they must follow. A follow-up letter reiterating our position is necessary to safeguard Koppers.

*Sewy*  
Gerald L. Daugherty

GLD/mz

cc: T. A. Beatty

# KOPPERS

## Interoffice Correspondence

To Mr. David W. Stevenson  
Real Estate Section  
Location Pittsburgh, PA K/1928  
Subject Operating Agreement/Tankage Lease  
Time Oil Co., Portland, Or and  
W T C Dept.

From R. F. Simmons  
Location St. Louis, Missouri  
Date January 14, 1976

Confirming our conversation we desire for our arrangement to continue  
another five year term through February 28, 1982.

R. F. Simmons

RFS/sjk

cc: R. G. Hamilton  
F. Klasnick

# KOPPERS

## Interoffice Correspondence

To Mr. R. E. Simmons  
Location St. Louis, Missouri  
Subject Operating Agreement and  
Lease of Tanks  
Portland, Oregon

From Real Estate Section  
Location Pittsburgh, Pa.  
Date January 9, 1976

Under date of March 1, 1967, Wood Treating Chemicals Co. (now Koppers Company, Inc.) entered an operating agreement and lease of tanks with Time Oil Company at Portland, Oregon, for a term of five years from March 1, 1967, to February 29, 1972, at an annual handling charge of \$7,380. This agreement automatically renewed in 1972 for a further term of five years from March 1, 1972, to February 28, 1977, at the same handling charge.

Under the terms of the agreement, both parties have the right to cancel the agreement as of February 28, 1977, by giving notice to the other party on or before February 29, 1976.

We assume that you will permit this operating agreement and lease of tanks to renew automatically for a further term of five years from March 1, 1977, to February 28, 1982. If such is not the case, please advise.



David W. Stevenson

DWS/sf

cc: R. G. Hamilton

May 9, 1975

Mr. Neil Gallagher  
Time Oil Company  
P. O. Box 03117 - St. John's Station  
Portland, Oregon 97203

Dear Neil:

We are writing to inform you of a recent oil spill at one of our customers' plant and resultant action because they were slow in reporting it. The wood preserving plant, operating on an inland stream, had a small spill and apparently were negligent in immediately reporting it to the authorities. The coast guard considered the slowness in reporting to be a criminal offense and the president and an employee who was considered the lowest one in line authority to instruct personnel on spill procedure handling was hauled into court. Fortunately, it was our customers' good fortune to draw an understanding judge who thought they were not trying to evade the law and assessed only a \$100 fine; we understand the fine could have been \$5000.

We bring this incident to you as information only in the hope that we all are more vigilant in guarding against industrial pollution.

Best Regards,

R. F. Simmons  
Operations Manager

RFS/sjk

December 31, 1973

Mr. Neil Gallagher  
Time Oil Co.  
P. O. Box 03117  
St. John's Station  
Portland, Oregon 97203

Dear Neil:

John Hite from Pittsburgh general office will be out with John Messner on February 4 and 5. Messner will be contacting you to advise that Mr. Hite would like to visit Time Oil while in the area. For your information, John Hite is the assistant manager of the Specialty Wood Chemicals Group of which Wood Treating is a department. We will appreciate the usual fine courtesy extended your visitors and am sure you will find Mr. Hite an energetic and pleasant fellow.

Best regards,

R. F. Simmons,  
Plant Manager

P.S. Have also been intending to drop you a note as a reminder that beginning Jan. 1, 1974, Lot Numbers should begin with WD-001-T.

RFS/pc

# WOOD TREATING CHEMICALS CO.

5137 Southwest Avenue / St. Louis, Missouri 63110 / 314 PR 2-2200

December 8, 1971

Time Oil Co.  
5150 Wilshire Boulevard  
Los Angeles, California

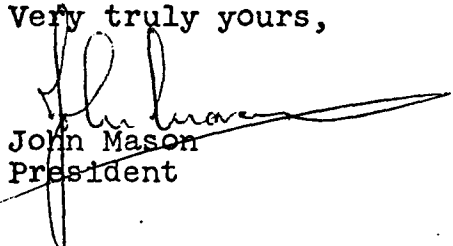
Gentlemen:

This notice is to advise you that effective as of December 1, 1971, Wood Treating Chemicals Co. sold to Koppers Company, Inc., Pittsburgh, Pennsylvania 15219, the majority of its wood preservatives business assets. As an integral part of this transaction, Wood Treating is seeking your consent to the assignment and assumption of your contract dated April 1, 1967, by and between your company and Wood Treating to Koppers. Koppers is in possession of a copy of this document and has pledged to abide by all the terms and conditions of the contract.

While Wood Treating will no longer be in the wood preservatives business, it is anticipated that upon your consent the aforescribed transfer will have no material effect upon the business you previously transacted with Wood Treating and that Koppers will continue the wood preservatives business in a most vigorous fashion in furtherance of your mutual interests and profits.

If you consent to the assignment and assumption of your contract by Wood Treating Chemicals Co. to Koppers Company, Inc., please indicate your agreement by executing a copy of this letter and returning same to Wood Treating Chemicals Co., 800 North Lindbergh Boulevard, St. Louis, Missouri 63166, Attention John Mason, President.

Very truly yours,

  
John Mason  
President

Accepted and Agreed to this  
\_\_\_\_ day of \_\_\_\_\_, 1971.

TIME OIL CO.

By \_\_\_\_\_

A S S I G N M E N T

WHEREAS, under date of March 1, 1967 and amended schedule of August 1, 1970 the undersigned WOOD TREATING CHEMICALS CO. entered into an agreement with TIME OIL CO., a Washington corporation, a copy of which is attached hereto marked Exhibit "A" and

WHEREAS, KOPPERS COMPANY, INC. of Pittsburg, Pennsylvania has purchased a majority of the wood preservative business assets of WOOD TREATING CHEMICALS CO.,

NOW, THEREFORE, in consideration of the mutual promises and covenants contained in this assignment, acceptance thereof by KOPPERS COMPANY, INC. and consent thereto by TIME OIL CO., WOOD TREATING CHEMICALS CO. hereby assigns to KOPPERS COMPANY, INC. all right, title and interest in and to the attached contract, accounts payable thereunder, property therein described and rights therefrom ensuing, subject to all the conditions thereof.

IN WITNESS WHEREOF, the undersigned has executed this assignment, this 1<sup>st</sup> day of December, 1971.  
as of

WOOD TREATING CHEMICALS CO.

By  *W. L.*

ACCEPTANCE OF ASSIGNMENT

Assignee KOPPERS COMPANY, INC. hereby accepts the above assignment and agrees to assume and fulfill all conditions and obligations therein contained and contained in the agreement attached hereto marked Exhibit "A" on the part of the Assignor WOOD TREATING CHEMICALS CO. therein to be fulfilled.

KOPPERS COMPANY, INC.

By  *W. L.*



CONSENT TO ASSIGNMENT

TIME OIL CO. hereby consents to the assignment of that certain contract entered into between TIME OIL CO. and WOOD TREATING CHEMICALS CO. dated March 1, 1967 and amended August 1, 1970 by amended schedule, a copy of which TIME OIL CO. acknowledges is hereto attached.

TIME OIL CO.

By Newton P. Leah - 2' Pres

# WOOD TREATING CHEMICALS CO.

5137 Southwest Avenue / St. Louis, Missouri 63110 / 314 PR 2-2200

July 27, 1970

Mr. Newton P. Lesh  
Time Oil Company  
12005 N. Burgard  
P.O. Box 03117 - St. Johns Station  
Portland, Oregon 97203

Dear Newt:

We have reviewed your proposed amended schedule and other changes to the original contract dated March 1, 1967, and are in agreement, except for the following:

- ✓ 1) Add in the 38,000 gallon tank under the Facilities caption and change the \$440 per month to \$615 in the Handling & Transfer Charges section.
- ✓ 2) On your page 2, paragraph 3, line 6 - I am sure the \$5,8125 was a typing error and should read: \$5.8125.
- ✓ 3) Reference to page 5, paragraph 8, line 2 - I have no Exhibit B, and if I did have I think you should have to give us notice of such rules change.
- ✓ 4) Reference to page 7, paragraph 10 - we would have no leverage here since the proposed language would eliminate, for practical purposes, the value of this provision to us as the customer.
- 5) If you feel it necessary to add the provision relating to pollution, I would suggest it read: "Customer shall reimburse Operator for fines imposed upon Operator by a court of law and paid in full by Operator, which fines are for pollution, expressly prohibited by statute, proved in said court to have been caused solely by the correct, non-negligent performance by Operator of written instructions given by Customer to Operator under and pursuant to this Agreement."

Page Two

- 6) I would suggest that the following text be used for the force majeure provision of the contract, section 13, sub-paragraph (a):

"Performance of any obligation under this Agreement may be suspended by either party, in whole or in part, without liability, in the event of Act of God, war, riot, fire, explosion, flood, drought, sabotage, inability to obtain fuel or power, accident, national, state, or other governmental laws, regulations, rules or orders, or any other circumstance of like nature beyond the reasonable control of such party, or labor trouble, strike, lockout, or injunction, whether or not any such event is within the reasonable control of such party, which delays, prevents, restricts or limits the performance of this Agreement or the consumption, sale, use or end use of the Products or any Product manufactured or processed therefrom or therewith. The affected party shall invoke this provision by promptly notifying the other party of the nature and estimated duration of the suspension period. At Customer's option, the period specified for processing and/or delivery of the Products hereunder shall be extended by the period of delay occasioned by any such suspension and processing or deliveries not performed or made during any suspension period shall be performed or made during such extension period, or the period specified for processing and/or delivery shall not be extended and the total contract quantity hereunder shall be reduced by the processing or deliveries not performed or made during such suspension period and, in either event, the Contract shall otherwise remain unaffected. "

- 7) The effective date should be August 1, 1970.

Regards,

Lowell E. Gutzler ✓  
Controller

LEG/lr

503

PHONE 286-1611

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 03117, ST. JOHNS STATION, PORTLAND, OREGON 97203

July 6, 1970

Mr. R. F. Simmons  
Wood Treating Chemicals Co.  
5137 Southwest Avenue  
St. Louis, Missouri 63110

Dear Bob:

Attached are three copies of the Amended Schedule of our Agreement dated March 1, 1967 to adjust the charges for our services as we discussed when you were here recently. After you have reviewed the Schedule, if you have any questions, please call me. The charges are as we discussed when you were here.

A few additional changes or additions were made to the Agreement which our company felt necessary to have in order that there might be no misunderstanding in our operation. The Amended Schedule is dated to commence on June 1, 1970, but since we have already billed you for the month of June, this starting date should be changed to July 1, 1970.

*See additional  
to be reviewed  
attached*

Regarding the rental for the 38,000 gallon tank, we believe we should have \$175.00 per month for this tank. We have been unable to find any used 6,000 or 8,000 gallon tanks for sale, but believe that some will be available in the future, as we have several feelers out for tanks of this size. We recently purchased a new 8,000 gallon tank for \$863.00 and 6,000 gallon tanks would probably cost around \$650.00. If you are interested in new tanks, please let me know and I will get an exact quotation for them.

Yours very truly,

Newton P. Lesh

NPL/s  
3 Encl.

BZTO104(e)012201

A M E N D E D   S C H E D U L E

TERMINAL: TIME OIL CO., Portland, Oregon

DATE OF AGREEMENT: March 1, 1967  
June 1, 1970 amended schedule.

INITIAL TERM OF AGREEMENT: April 1, 1967 to March 31, 1972.

OPERATOR: TIME OIL CO.

CUSTOMER: WOOD TREATING CHEMICALS CO.

PRODUCTS TO BE STORED: Raw materials in bulk, drums and bags for wood preservatives.

Finished products in bulk and drums.

Also, such other raw materials and finished products specified by the Customer and accepted by the Operator.

FACILITIES: Operator will furnish Customer the following facilities:

Storage tanks - three (3) tanks with a shell capacity of approximately 20,570 gallons each, one (1) tank with a shell capacity of approximately 13,000 gallons, one (1) blending tank of approximately 1,500 gallons equipped with six (6) electric heating elements, together with warehouse space for storing approximately 100,000 pounds of raw or finished materials on pallets in drums and bags.

SERVICES: Operator shall receive the raw materials from railroad tank cars or freight cars and/or trucks and shall deliver such products into storage tanks and/or warehouse.

Storage and Handling Operator shall deliver the finished products into storage, trucks and/or railroad cars.

Operator shall mix or blend products at a temperature not to exceed 180 deg. F.

HANDLING AND TRANSFER CHARGES: The only charges for the facilities and services herein are the following:

\$440.00 per month to be billed in advance on the first day of each month and paid by Customer within 10 days after receipt of invoice.

One cent (0.01) per gallon for blending and shipping pentapetroleum or LST type solutions shipped in tank cars, tank trucks or drums that can be bulk or tank blended. These products are Customer's products known as:

CHARGES: cont.

1. Woodtox Preprime RTU
2. Woodtox 140 RTU
3. Presstreat
4. Woodtox 109 RTU
5. Woodtox 109 w/o Penta

Other products of similar type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Three cents (0.03) per gallon for blending and shipping concentrate type solutions in tank cars, tank trucks or drums. These products are Customer's products known as:

1. Timbertox 40 Concentrate
2. WR 340 Concentrate
3. Woodtox Preprime Concentrate
4. Woodtox 140 Concentrate
5. Inhibitor L.
6. Penta Wood Preservative Concentrate

Other concentrate type solutions can be added from time to time by Customer upon written acceptance by the Operator.

Five cents (0.05) per gallon for filling 55 gallon drums.

One cent (0.01) per gallon for blending contaminated products returned to storage and/or blending Woodtox 109 w/o Penta to include Penta.

Seventy-five (0.75) cents for each 55 gallon drum of additives shipped that have been in storage and are shipped without blending with other products.

Blending, shipping and drum filling charges are to be invoiced by Operator to the Customer on the first day of each month for the shipments made during the previous month and Customer agrees to pay charges within 10 days after receipt of invoice.

Overtime and extra labor and cost of armed guards as specified in Sections B.3, D.9(a) and 13 (c) of the Agreement to which this Schedule is annexed and which it is a part.

It is agreed by the parties hereto that the Schedule attached to the Agreement dated the 1st day of March, 1967, shall be superceded and replaced in its entirety by this Amended Schedule effective June 1, 1970.

It is further agreed that said Agreement dated the 1st day of March, 1967 is further amended as follows:

On Page 1, Section A. FACILITIES, Paragraph 2, line 7 after the word Agreement shall be added "Customer shall, however, inform Operator of any irregularities or deficiencies discovered during any such inspection."

On page 2, Paragraph 3, line 6. The amount \$5,8125 shall be substituted for the amount of \$4.25 stated therein.

On Page 4, Paragraph 6, line 3. The word "similar" shall be deleted and after the word "cause" shall be added "beyond the control of Operator."

On Page 5, Paragraph 8, line 2. The words "as of the date of this Agreement" shall be deleted and the words "from time to time" shall be substituted therefore. Also, in lines 4 and 5, the sentence "Such rules shall not hereafter be amended except by consent of Customer." shall be deleted.

On Page 5, Paragraph 9. (a) wherever the amount of \$2.71 is stated the amount of \$3.875 shall be substituted therefore.

On Page 7, Paragraph 10. The following words shall be added to the end thereof. "but only if all charges and costs due Operator by Customer shall have been paid in full."

The following provisions are incorporated therein:

Disposal of waste shall be for the Customer's account but subject to Customer's prior approval of expenditures for that purpose.

Customer shall reimburse Operator for any fines or penalties for any alleged pollution arising out of the performance of this agreement in according with instructions given Operator by Customer.

All other of the terms and provisions of said Agreement shall remain the same and in full force and effect.

Witness:

TIME OIL CO., Operator

\_\_\_\_\_

By R. D. Abendroth, President

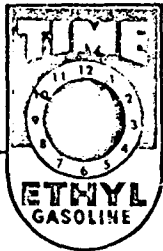
Witness:

WOOD TREATING CHEMICALS CO.

\_\_\_\_\_

By \_\_\_\_\_

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



PHONE 286-1611

## TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 03117, ST. JOHNS STATION, PORTLAND, OREGON 97203

June 19, 1970

Mr. R. F. Simmons  
Wood Treating Chemicals Co.  
5137 Southwest Avenue  
St. Louis, Missouri 63110

Dear Bob:

I thought I would have the Amended Schedule for our Agreement approved and in the mail to you before I left, but the wheels of industry sometimes turn at a slow pace. I am sure it will be ready to send you when I return on the 29th.

Regarding the sandblasting and painting of the 7,000 gallon tank you have here, we have a man, Paul Hendricks, who will sandblast to bare metal and apply two coats of Rustoleum for \$100.00. He will furnish the paint needed for the tank for this price. Paul is our maintenance man and I am sure he will do a good job. He said that he would keep track of the time and material on this tank and if you have more tanks in the future, he could perhaps lower his price some.

I find that we do not have any used tanks available, but will keep my eyes open for any that might be for sale in this area.

I enjoyed your visit very much and hope you can make it out this way this fall.

Yours very truly,

Newton P. Lesh

NPL/s

BZTO104(e)012205



SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



(2)  
PHONE AVENUE 6.1611

## TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX ~~2937~~, ST. JOHNS STATION, PORTLAND, OREGON ~~97203~~ 97203  
03117

August 15, 1967

Mr. R. M. Morriss, Jr.  
Wood Treating Chemicals Co.  
5137 Southwest Avenue  
St. Louis, Missouri 63110

Dear Mr. Morriss:

I am forwarding you three samples of Woodtox 140 which have been taken at different levels from our storage tank. One has been taken from the top, one from the middle and one from the bottom.

We mixed a 7,000 gallon batch yesterday and filled our tank to capacity, circulating the tank for four hours from top to bottom. In a conversation with Herb Morissette today, we want to try and determine if this period of circulating the tank is sufficient to properly mix the product so that the penta content is the same at all levels of the tank. If you will have the samples checked and advise us as to the percent of penta in each sample, we can decide if we should circulate the product for a longer length of time after a blend.

If the product checks out with the same percentage of penta at each level, perhaps you will want us to adjust our formula slightly to bring the penta more in line to the desired amount.

Let me know how the samples check and we will govern ourselves accordingly as to the length of time to circulate each blend.

Yours very truly,

*Newton P. Lesh*  
Newton P. Lesh

NPL/s  
cc HEMorissette

BZTO104(e)012206

August 23, 1967

Mr. Newton P. Lesh  
Time Oil Company  
P. O. Box 03117  
Portland, Oregon

Dear Mr. Lesh:

Thank you for your letter of August 15th, and our laboratory has been alerted to process the three samples of Woodtox 140 from your blending plant as soon as they have been received.

George Mills has been asked to send the results of the analyses to you and to Herb as soon as the testing has been completed.

Yours very truly,

R. M. Morriss, Jr.

RMM:jm  
cc-Mr. H. E. Morissette  
Mr. G. B. Mills

BZTO104(e)012207

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



(2)  
PHONE AVENUE 6-1611

## TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 2997, ST. JOHNS STATION, PORTLAND, OREGON 97203  
03117

August 15, 1967

Mr. R. M. Morriss, Jr.  
Wood Treating Chemicals Co.  
5137 Southwest Avenue  
St. Louis, Missouri 63110

Dear Mr. Morriss:

I am forwarding you three samples of Woodtox 140 which have been taken at different levels from our storage tank. One has been taken from the top, one from the middle and one from the bottom.

We mixed a 7,000 gallon batch yesterday and filled our tank to capacity, circulating the tank for four hours from top to bottom. In a conversation with Herb Morissette today, we want to try and determine if this period of circulating the tank is sufficient to properly mix the product so that the penta content is the same at all levels of the tank. If you will have the samples checked and advise us as to the percent of penta in each sample, we can decide if we should circulate the product for a longer length of time after a blend.

If the product checks out with the same percentage of penta at each level, perhaps you will want us to adjust our formula slightly to bring the penta more in line to the desired amount.

Let me know how the samples check and we will govern ourselves accordingly as to the length of time to circulate each blend.

Yours very truly,

*Newton P. Lesh*  
Newton P. Lesh

NPL/s  
cc HEMorissette

BZTO104(e)012208

August 23, 1967

Mr. Newton P. Lesh  
Time Oil Company  
P. O. Box 03117  
Portland, Oregon

Dear Mr. Lesh:

Thank you for your letter of August 15th, and our laboratory has been alerted to process the three samples of Woodtox 140 from your blending plant as soon as they have been received.

George Mills has been asked to send the results of the analyses to you and to Herb as soon as the testing has been completed.

Yours very truly,

R. M. Morriss, Jr.

RMM:jm  
cc-Mr. H. E. Morissette  
Mr. G. B. Mills

March 22, 1967

Mr. Newton P. Lesh  
Time Oil Company  
P. O. Box 03117  
Saint John's Station  
Portland, Oregon 97203

Dear Mr. Lesh:

This will acknowledge your letter of March 3rd with regard to the pending storage and blending agreement between our companies, and this has now been handled with the Monsanto law department.

With some minor changes, or corrections, it would appear that we are now to the point of preparing the final draft for execution and which we presume your people will handle. The original and copy that was sent to us with your letter of March 3rd is enclosed. Re-typing of the entire document is certainly not indicated to cover the following:

1. Time has omitted the definition of gallons in paragraph 9(d) of the Monsanto draft of the agreement. I see no objection to calculating the amount of Products shipped or delivered in other convenient units, but I would suggest that you check to see what measurement procedure Time is contemplating.
2. In paragraph 13(a) of the Time draft of the agreement, in line 2 "licable" should be "liable" and in line 12 "delivery" should be "deliver".
3. In paragraph 16(a) Time has stated the term of the agreement to be March 1, 1967 to February 29, 1972. Of course, there is no objection to this term. The change made by Time to paragraph 16(b) appears to be appropriate since some of the improvements to the Facilities will be made prior to the date of the agreement and the Monsanto draft provided for reimbursement only for improvements made subsequent to the date of the agreement.

Page Two

4. In line 2 of paragraph 17 of the Time draft "State of Federal" should read "State or Federal".

With respect to the starting date, it was supposed to be when the facility was ready; but for accounting purposes it might be more convenient to date it April 1, 1967, and the few extra days of income in March 1967 would be picked up in March 1972. Whatever date you decide will be satisfactory in March, or April 1, 1967 for the final draft.

Enclosed is a copy of the Monsanto Warehousing and Terminaling Unified Procedure. In general this is to apply, although we will cover by separate letter or correspondence the Wood Treating Chemicals Co. forms, etc., that we actually use which are different from those of the parent company.

Yours very truly,

R. M. Morriss, Jr.

RMM:jm  
Enc.

SEATTLE  
TACOMA  
PORTLAND  
STOCKTON  
OAKLAND  
SAN PEDRO  
LOS ANGELES



# TIME OIL COMPANY

12005 N. BURGARD, P. O. BOX 517, ST. JOHNS STATION, PORTLAND, OREGON 97203  
03117

March 3, 1967

Mr. R. M. Morriss, Jr.  
Wood Treating Chemicals Co.  
5137 Southwest Avenue  
St. Louis, Missouri 63110

*See (d) 98 Mon.  
not in time oil version  
March 17*

Dear Mr. Morriss:

Enclosed are four executed copies of the Agreement for storing and blending your products. The enclosed Agreement has been changed very little from the one you sent us recently which was prepared by your people.

Paragraph 9b has had a clause added at the end which reads "or 3/4 of 1% of maximum amount of products stored in any one month, whichever is the greater". Our people feel that this is necessary and it conforms with our Standard Form Agreement previously submitted to you.

*Check this*  
Paragraph 16b has been rewritten and I believe is the understanding of all concerned in the event you cancel this Agreement at any time during the first five years.

We have not seen a copy of the booklet "Monsanto Warehousing and Terminating Unified Procedures". We have agreed in the Agreement to follow the procedures outlined in the booklet, but will want to read the booklet before final acceptance of this Agreement. We do not anticipate any problem with the procedures as long as they are not contradictory to this Agreement.

The Schedule attached to the Agreement covers 3 tanks with a capacity of 20,570 gallons each, one tank with a capacity of 13,000 gallons, one blending tank with a capacity of approximately 1,500 gallons and equipped with 6 electric heating elements, warehouse space for approximately 100,000 pounds of additives in drums and bags. The charges for this we have reduced to \$440.00 per month, which we believe is fair for this number of tanks and the amount of warehouse furnished. It was our understanding in our last conversation with Mr. Morissette that this is the number of tanks you desired and the amount of warehouse space needed.

We have the above tanks all set up and ready to go. The electrical work will be completed Monday and painting of the tanks will be completed in a few days, weather permitting. We received the tank car of Solvent B-6 on February 28, 1967 and discharged it into one of the 20,000 gallon tanks.

Two of the 20,000 gallon tanks have been piped so that the product can be circulated from the bottom of the tank to the top of the tank; products can be transferred from any one tank to another; and up turned elbows are in the bottoms of all the

Mr. R. M. Morriss, Jr.  
Wood Treating Chemicals Co.

-2-

March 3, 1967

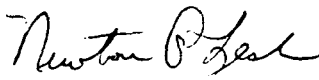
tanks so that the product is not drawn directly from the bottom of the tank, excepting the blending tank which has a bottom draw so that the tank can be drained completely. There are bottom draws on all of the tanks so that any sludge or tank bottoms can be drained completely.

Mr. Morissette has been out of town since we have been putting the tanks together, but I expect to see him the first of the week so that he can inspect the tanks. We will be ready to start blending products for you at any time.

The dollar value to be inserted in paragraph 16b will be confirmed to you by letter when all the costs are completed.

Yours very truly,

TIME OIL CO.

By   
Newton P. Lesh

NPL/lp



*file*

WOOD TREATING  
CHEMICALS CO.

5137 Southwest Avenue / St. Louis, Missouri 63110 / 314 PR 2-2200

February 14, 1967

Mr. Newton P. Lesh  
Time Oil Company  
P. O. Box 03117  
Portland, Oregon 97203

Dear Mr. Lesh:

As per my letter of January 30th, we referred to the Monsanto law and distribution departments your standard "Agreement" form covering your terminal services, etc., and the schedule attachment thereto covering the special blending services at Portland that we are in the process of working out between our companies.

With respect to your Agreement form, Mr. J. M. Bray of the Monsanto law department has drafted, as per duplicate copies enclosed, a new agreement to conform to Monsanto practice on such terminalling arrangements, etc. The memo from the distribution department, two copies of which are also enclosed, will possibly explain in all instances the reasons for the changes. Undoubtedly, you will now want to refer this to your legal counsel and let them advise you of what significant changes have been made between the two drafts and/or which of these changes are unacceptable and need to be further negotiated or resolved. A lot of the wording is, of course, just standard "boiler plate", but I do not believe you will find it too biased in our favor.

With respect to the "Schedule" attachment to the Agreement we have the following comments.

Storage Tanks

We note that the rate is to be \$250 monthly if one of the 20,570 gallon tanks is provided, or \$450 monthly if three of the 20,570 gallon tanks are provided. This is equivalent to \$100 per month for each of the extra 20,570 gallon tanks. Our engineering department advised that the cost of a coiled, new 20,000 gallon

Page Two

Storage Tanks (continued)

vertical storage tank is about \$2,400 in this area, or approximately \$3,500 each piped up for receipt and car or truck shipment of blended product. On the basis of the rental proposal, Time Oil Company could offset the cost of a new tank installation in about three years, and used tanks are to be provided. The three 20,000 gallon tanks at \$350 monthly would seem to be a more equitable rental.

Receiving Tanks

We instructed Herb Morissette to ask that you include with the storage tanks a receiving tank of at least 15,000 gallons capacity or sufficient to unload two tank trucks of solvent. The cost of blending one truck of product at a time would probably be excessive, and the standard procedure would be to blend at intervals and three or four truckloads at a time. One 20,000 gallon tank will be for storage of a raw material or additives, but two of the 20,000 gallon tanks would be used for blended product and from each of which about three trucks could be shipped. Once either of the finished product tanks were below one truckload or less, you could fill it, or both tanks, up again to 20,000 gallons each and that would mean scheduling in three or four truckloads of mineral spirits; hence the need for a solvent receiving tank to avoid truck demurrage. The question is the extra cost for this extra tank, and even though it would serve as a convenience for your people.

Charges

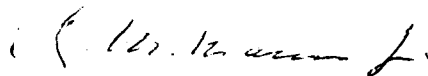
These seem to be in order except for the discrepancy of rental for just the two extra tanks. At the moment no blending of concentrate is contemplated; but if, and when, we want such service, that charge would have to be negotiated.

Term, Etc.

This is covered in the proposed Monsanto agreement, as well as reimbursement for the installation costs in the event that we cancel at an early date.

We are desirous of getting this settled as soon as possible, and to get started with the blending. I shall be out of town for the next two weeks, but Herb Morissette will know how to reach me at all times and if we are so far apart on any of these details that they might cause a hold up or delay.

Yours very truly,

  
R. M. Morriss, Jr.

Enc.

cc-Mr. H. E. Morissette

C. F. Grafton  
B. C. Downs

January 20, 1967

Time Oil Company  
Portland, Oregon

H. E. Morissette

Will you please advise Mr. Lesh that we are, in principle, accepting his proposal on the blending subject to adjustment or clarification of some of the details pertaining thereto and which are as follows:

1. It appears now that we will probably want an additional 20,000 gallon tank for storage of finished product. We probably should also have a storage tank for mineral spirits and for immediate unloading of solvent upon receipt of up to two tank truck or trailer loads. Presumably this would mean another or second extra tank of a capacity of about 15,000 gallons. What would the extra rental per month be for this added tankage and assuming the same thru put income annual figures, or would they provide the extra tankage for free if we guaranteed a 300,000 gallon annual thru put?
2. This proposal is based on their storing approximately 60,000 pounds of additive: 55 gallon drums of concentrates and pallets of the bagged penta. We would plan to start off with at least 40,000 pounds of penta and 100 drums of concentrate, which might be about 100,000 pounds. Also if we achieve the anticipated activity here we may hit peak inventory storage of 150,000 pounds, but the usage probably would not exceed 100,000 pounds.
3. They have set up the terms of the agreement as 5 years and we presume this is to amortize the cost of the blending installation. We have no great objection to the 5 year term, although we might prefer a 3 year term, but because of this part of the commitment it will have to be cleared with Monsanto and we have that underway. There will be two questions in that connection that we can anticipate: the inclusion of an option to renew for another 5 years, and our termination rights for cause if Time Oil does a poor job of the mixing or blending, etc. The rights to cancel for nonpayment, etc. are standard phraseology, but our rights under certain conditions are not spelled out. Perhaps this could be handled in a codicil letter to the agreement and still use their standard agreement form.
4. Our target date is now March 1st to get started. Presumably the agreement would start from the date the facility is ready for the blending, and this is so indicated in Mr. Lesh's cover letter.

Page Two

5. We are also interested in this bulk storage on the mineral spirits which you reported on separately. That would depend on our being able to negotiate a favorable barge price on mineral spirits and how our volume goes or is shaping up on products shipped from this Portland blending plant. Miller seems to think we might get about 2¢ per gallon off, but you might try 3¢ per gallon on "your friend" Bronson, and while you are at it insist on a 375° F. end point to match LP3. If he will furnish that at 2¢ under schedule I think we can make a deal with him to take the 210,000 gallon tank. If the product volume really picks up we might have to take the larger tank because the minimum barge lot would probably be 200,000 gallons and the scheduling would have to be almost foolproof and exactly timed to get the second lot in just when the other has been used up. Anyway this bulk storage would have to be a separate negotiation agreement with Time Oil, and could they pipe or hook up the bulk storage tank 5006 or tank 9509 with the blending plant? If long lines are involved it might be cheaper for them to run it by their tank trucks to the blending plant solvent storage.
6. We need a clarification on the escalation clause which is the next to the last paragraph on page 2 of the agreement. Presumably this increase in their charges if the labor rates go up applies only to the thru put, which is referred to in the agreement as applying to transfer charges and as set forth in schedule S.
7. The final question on the blending agreement would be the suitability or cleanliness of the small storage tanks for our product storage. Their agreement form gives almost release therein in full to themselves for product contamination, but if the tanks were formerly used for heavy oil products they must be adequately cleaned prior to our usage. I understood Mr. Lesh to say that they were formerly used at the Portland Gas plant for storage of light coal tar solvents such as Benzol or Toluol. However, if they have been idle for years they may be badly rusted or otherwise fouled up inside.

I do want to get this wrapped up and started before I take off for vacation the end of next week, so get with Mr. Lesh as soon as possible to get the answers to the above. I am sending the Time Oil Company agreement over to the Monsanto legal department to see if there are any major objections to the form of this agreement, advising them that the final figures in the attached schedule are still being negotiated.

R. M. Morriss, Jr.

RMM/lr

**Monsanto****RAPID-GRAM**

TO (Please Print)

SUBJECT

MESSAGE

REPLY

Rube Morris Jr

- Rube:

We located Time Cells in Portland yesterday.

They have a 30,000 gal tank and will mix R.T.V. using 4000 gals of Lac + 16000 gals of Mineral Spirits. They will handle + store, there charge (drummed)

will be  $\frac{1}{4}$  Cent in and  $\frac{1}{4}$  cent out plus tank rental of 150.00/month. This includes the cost of mixing, sampling etc.

We are meeting tomorrow with three engineers from Seattle and we will work on costs to mfg. the R.T.V. from the dry lumps + Shoring

SENDER'S FULL NAME (Please Print)

DATE

SIGNATURE

DATE

Peters →

G-1140

**Monsanto****RAPID-GRAM**

TO (Please Print)

SUBJECT

MESSAGE

REPLY

Page 2

attached is a copy of their regular agreement they have done work for Shell Chemical + other major producers.

We will give you a complete report when we have had a chance to talk

to three engineers.

Hurt  
Monsanto

Please make me a copy of the attached so I can study it

SENDER'S FULL NAME (Please Print)

DATE

SIGNATURE

DATE

Hurt M

Dec 14 66

G-1140

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BEAZER EAST, INC.

OPENED: 08-30-1990

TIME OIL

TIME OIL - GENERAL CASE

BEAZER CASE NO.: 8232

GENERAL - AS REQUIRED

GENERAL  
FOLDER #:0010

SHUFTAN, ROBERT L.

